PROCEEDINGS BOOK

The 18th Indonesian Scientific Conference in Japan

Enhancing Indonesian Competitiveness

**PPI JEPANG
PPI CHUBU
PPI NAGOYA**

Nagoya, 7 – 8 August 2010
The Indonesian Student Association in Japan
Embassy of Republic of Indonesia – Tokyo, Japan

INDONESIAN Embassy *Tokyo*

Sponsored by:

BANK INDONESIA
BANK SENTRAL REPUBLIK INDONESIA

河合塾

YAMAHA

PERTAMINA   Garuda Indonesia

Panasonic
ideas for life

TABLE OF CONTENT
DAFTAR ISI

2.   MEDICAL SCIENCE

REPORT SPEECH

CHAIR OF THE 18TH INDONESIAN SCIENTIFIC CONFERENCE IN JAPAN

KATA PENGANTAR DARI KETUA PANITIA TEMU ILMIAH KE-18 PPIJ

Assalamualaikum warahmatullahi wabarakatuh/Salam sejahtera bagi kita semua,

Temu Ilmiah (TI), merupakan kegiatan rutin PPI Jepang yang dilaksanakan dalam setiap periode kepengurusan untuk memfasilitasi saling tukar informasi dan berdiskusi tentang berbagai tema riset. TI yang diadakan pada tanggal 7-8 Agustus 2010 di Graduate School of International Development, Nayoya University, Nagoya, merupakan TI yang ke-18. Secara khusus TI kali ini bertujuan untuk membangun jaringan berbasis ilmu pengetahuan antarpelajar Indonesia di Jepang, meningkatkan kapasitas dan kualitas riset, serta mendorong kerjasama dan sinergi antarpelajar dan peneliti.

Ada 115 abstrak yang diterima panitia dan sekitar 200 partisipan yang menghadiri kegiatan TI kali ini. Peserta tersebut berasal berbagai wilayah di Jepang. Mulai dari ujung utara (Hokkaido) sampai ke ujung selatan (Beppu-Kyushu). Mewakili teman-teman panitia, saya ucapkan terima kasih kepada seluruh partisipan yang telah berpartisipasi aktif pada kegiatan TI kali ini. Kemudian, saya juga mengucapkan terima kasih atas partisipasi para pembicara (*keynote speaker* dan *invited speaker*) yang telah bersedia hadir dan berdiskusi dengan para pelajar Indonesia se-Jepang.

Mereka adalah Ir. Harris Iskandar, Ph.D (Direktorat Jenderal Pendidikan Tinggi, Kementerian Pendidikan Nasional), Prof. Kosuke Mizuno (Kyoto University), Prof. Dr. Dewi Fortuna Anwar (LIPI), Junanto Herdiawan, MA (Bank Indonesia Perwakilan Tokyo), Dr. Fuziansyah Bachtar, M.Eng (R&D Inoac Corporation), Dr. Khoirul Anwar, M.Eng (Japan Institute for Science and Technology), dan Dr. Yond Rizal (Direktorat Jenderal Pajak, Kementerian Keuangan). Selanjutnya terima kasih saya ucapkan kepada Kedutaan Besar Republik Indonesia di Jepang, khususnya Atase Pendidikan dan Kebudayaan, beserta para sponsor lainnya; Bank Indonesia perwakilan Tokyo, Kawaijuku, Yamaha, Garuda Indonesia, dan Pertamina atas bantuannya sehingga acara ini dapat berjalan dengan lancar dan sukses.

Kemudian yang paling utama, saya juga menyampaikan terima kasih kepada semua panitia yang telah bekerja keras siang dan malam untuk menyukseskan penyelenggaraan Temu Ilmiah ke-18 PPI Jepang ini. Terakhir, mewakili seluruh panitia, saya ingin menyampaikan permohonan maaf yang sebesar-besarnya, jika pada penyelenggaraan TI kali ini masih terdapat banyak kekurangan. Semoga kekurangan-kekurangan tersebut dapat diperbaiki di masa mendatang.

Selamat datang di Nagoya, selamat presentasi dan salam sukses!

Oce Madril
Ketua Panitia Temu Ilmiah ke-18 PPI Jepang

REPORT SPEECH

CHAIR OF INDONESIAN STUDENT ASSOCIATION IN JAPAN

KATA PENGANTAR DARI KETUA PPI JEPANG

Assalamualaikum warahmatullahi wabarakatuh

Salam sejahtera bagi kita semua,

Persatuan Pelajar Indonesia di Jepang (PPI-Jepang) adalah perkumpulan pelajar terbesar yang mewadahi kegiatan pelajar Indonesia di Jepang. Dengan visi-nya *"membuka Dunia untuk Indonesia dan membuka Indonesia untuk Dunia"*, PPI-Jepang bertekad untuk selalu senantia melakukan berbagai macam upaya dan usaha demi perkembangan dan kemajuan bangsa dan tanah air Indonesia.

Salah satu bentuk kepedulian PPI-Jepang terhadap perkembangan ilmu pengetahuan dan pembangunan Indonesia diwujudkan dalam kegiatan rutin tahunan berupa temu ilmiah yang mengundang pelajar Indonesia di seluruh Jepang untuk ikut berpartisipasi. Temu ilmiah ini juga merupakan sebuah sarana diseminasi hasil karya penelitian pelajar Indonesia di Jepang, yang diharapkan nantinya mampu menjadi pondasi terciptanya pembangunan Indonesia yang berkelanjutan.

Buku ini merupakan kumpulan abstrak hasil penelitian para pelajar dan peneliti Indonesia di Jepang yang berpartisipasi pada acara ini. Selain itu, pada Temu Ilmiah ini juga diundang para pakar dari berbagai disipilin ilmu, seperti, Ir. Harris Iskandar, Ph.D (Sekretaris Direktorat Jenderal Pendidikan Tinggi, Kementerian Pendidikan Nasional), Prof. Kosuke Mizuno (Ahli sosial ekonomi pertanian dari Kyoto University) Prof. Dr. Dewi Fortuna Anwar (Ahli politik internasional LIPI yang sedang melakukan riset di CSEAS, Kyoto University), Junanto Hendriawan, MA (Ekonom Bank Indonesia Perwakilan Tokyo), Dr. Fuziansyah Bachtar, M.Eng (Inoac Corporation), Dr. Khoirul Anwar, M.Eng (Asisten Profesor Japan Institute for Science and Technology), Dr. Yond Rizal (Pejabat Direktorat Jenderal Pajak, Kementerian Keuangan yang sedang melakukan riset di Graduate School of International Development, Nagoya University) dan lain-lain untuk memperkaya ruang lingkup pembahasan dan diskusi.

Terima kasih yang sebesar-besarnya kami ucapkan kepada seluruh pihak yang turut membantu dan mendukung Temu Ilmiah ini. Atas nama panitia penyelenggara Temu Ilmiah PPI-Jepang Ke-18, saya dengan bangga dan berbahagia mengucapkan selamat datang kepada seluruh peserta dan pengunjung yang hadir.

Wassalam

Farid Triawan

Ketua Umum PPI-Jepang 2009-2010

THE 18TH INDONESIAN SCIENTIFIC CONFERENCE COMMITTEE
SUSUNAN KEPANITAAN

Pelindung

- Prof. Dr. Jusuf Anwar, Duta Besar Republik Indonesia di Jepang

Penasihat

- Prof. Dr. Edison Munaf, Atase Pendidikan dan Kebudayaan KBRI di Jepang
- Prof. Yuzuru Shimada, Profesor Graduate School of International Development, Nagoya University

Steering Committee

- Farid Triawan, Ketua Umum PPI Jepang
- Refi Iktiari, Ketua PPI Korda Hokkaido
- Fithra Faisal Hastiadi, Ketua PPI Korda Kanto
- Berry Juliadi, Ketua Korda PPI Korda Kansai
- Oce Madril, Ketua PPI Korda Chubu
- Ananda Setiyo Ivannanto, Korda Kyushu-Okinawa
- Titi Anggono, Korda Tohuku
- Hardian Susilo Addy, Korda Chugoku-Shikoku

Panitia Pelaksana

- **Ketua**

  Oce Madril, Graduate School of International Development, Nagoya University

- **Kesekretariatan**

  Aprilia Beta Suandi, Graduate School of Economics, Nagoya University (Koordinator)

  Irene Santi Br. Bukit, Tivany Edwin, Yan Novika

- **Bendahara**

  Indrie Mulyawati, Graduate School of International Development, Nagoya University (Koordinator)

  Poejowati Probo Wardani

- **Humas dan Sponsorship**

  Faisal Artjan, Graduate School of International Development, Nagoya University (Koordinator)

  Ryka Claudia Lolita, Bambang Pramono, Kunta Biddinika

- **Acara**

  Fatiyah, Graduate School of International Language and Cultures, Nagoya University (Koordinator)

  Rachmatunnisya, Fiona, Sunu Hadi, Donny Hendrawan, Inu Shidiq

- **Tim Makalah**

  Teguh Dartanto, Graduate School of International Development, Nagoya University (Koordinator)

  Maharani Hapsari, Slamet Raharjo, Yulia Eka Putri

- **Logistik**

  Hani Rahmat, Graduate School of International Development, Nagoya University (Koordinator)

  Matlal Fajri Alif, Rieza Rahardian, Dodik Kurniawan, Muhammad Huda, Haikal, Ibnu Akhmadi, Endra Gunawan

- **Dokumentasi**

  Puji Basuki Graduate School of International Development, Nagoya University (Koordinator)

  Roni, Benny Bayu Aji, Eka Oktariyanto Nugroho

- **Konsumsi**

  Henny Rosalinda, Graduate School of International Development, Nagoya University (Koordinator)

  Kusumandari, Abby Irawati

- **IT**

  Bayu Indrawan, Tokyo of Institute of Technology

THE 18TH INDONESIAN SCIENTIFIC CONFERENCE PROGRAM

SUSUNAN ACARA

Sabtu, 7 Agustus 2010: Temu Ilmiah

Jam	Acara
08.00 – 09.00	Daftar Ulang
09.00 – 10.20	Sesi Paralel 1
10.20 – 10.30	Snack Pagi
10.30 – 10.50	Sambutan:
10.50 – 13.00	Sesi Utama "Peluang dan Tantangan Menyongsong Indonesia Maju dan Berdaya saing Internasional" *Keynote Speech*: Ir. Harris Iskandar, Ph.D. Sekretaris Dinas Pendidikan Tinggi *Invited Speakers*: Prof. Dr. Kosuke Mizuno (Kyoto University) Dr. Dewi Fortuna Anwar (LIPI) Junanto Herdiawan, M.A. (Bank Indonesia)
13.00 – 14.00	Ishoma
14.00 – 15.20	Sesi Paralel 2
15.20 – 15.30	Perpindahan sesi
15.30 – 17.00	Sesi Paralel 3
17.00 – 17.30	Coffee Break
17.30 – 18.20	Diskusi Sains dan Teknologi Peningkatan kapasitas, kualitas dan relevansi riset yang berdaya saing internasional dan bermanfaat bagi pembangunan Indonesia. *Invited Speakers*: Fuziansyah Bachtar, Ph.D. (Inoac Corp.) Dr. Khoirul Anwar, M.Eng. (JAIST)
18.20 – 19.10	Diskusi Sosial Peranan Reformasi Birokrasi bagi Pembangunan Indonesia Dr. Yond Rizal (Ditjen Pajak)
19.10 – 19.30	Penutupan *Closing Remark*: Bank Indonesia Pembagian Sertifikat secara simbolik

Minggu, 8 Agustus 2010 `Rapat Koordinasi Nasional PPI se-Jepang`

Jam	Acara
08.00-08.30	Daftar Ulang
08.30-09.30	Pembukaan Rakornas
09.30-10.30	Paparan Kegiatan PPI Jepang 2009-2010
10.30-11.00	*Coffee break*
11.00-12.30	Diskusi antar PPI se-Jepang dengan tema : `Peran PPI se-Jepang dalam pembangunan Indonesia`
12.30-13.30	Ishoma
13.30-15.00	Lanjutan Diskusi
15.00-15.30	Penutupan
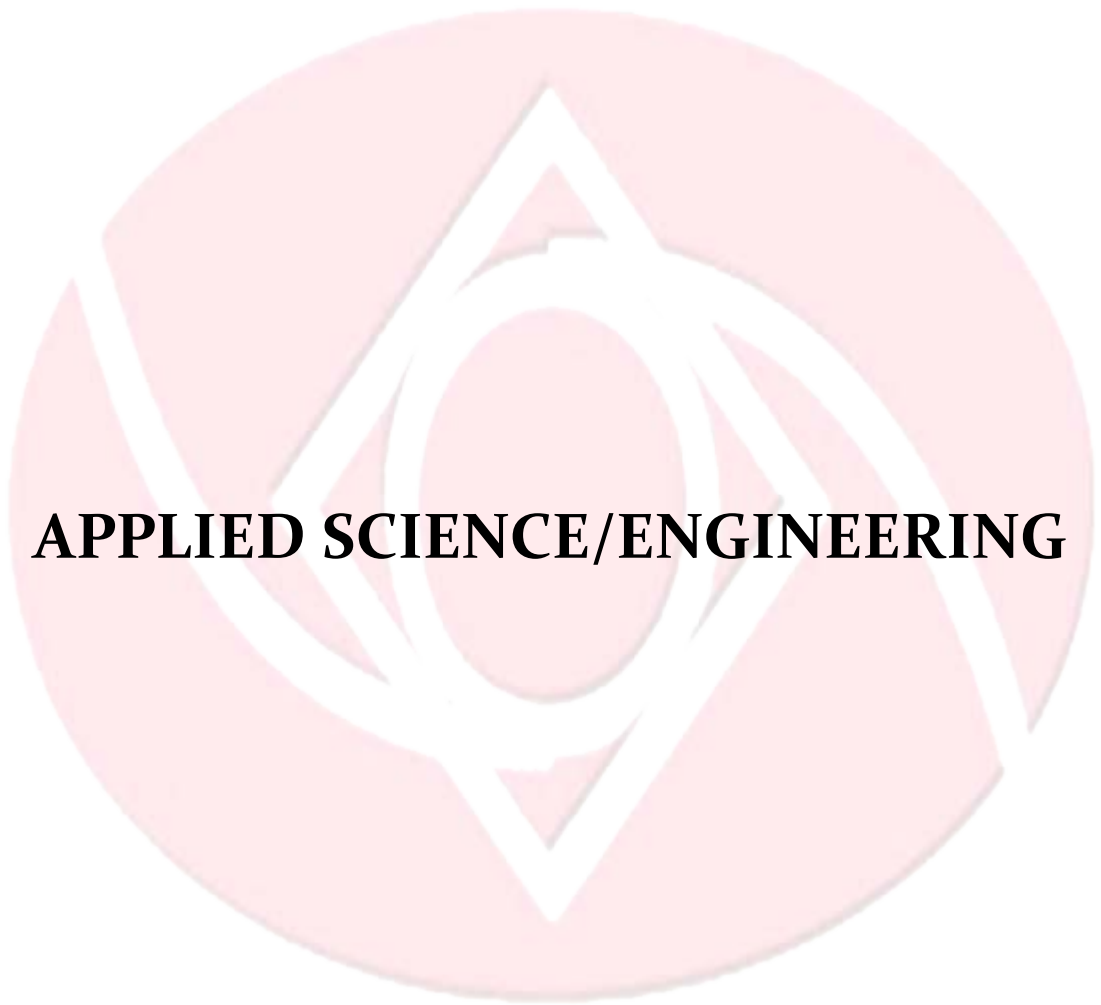
APPLIED SCIENCE/ENGINEERING

Perbandingan Berbagai Diameter Transduser Ultrasonic dalam Pengukuran Profil Kecepatan Aliran Turbulen di Daerah Dekat Dinding

Muhammad Kunta Biddinika[1], Noriyuki Watanabe, Masanori Aritomi

Research Laboratory for Nuclear Reactors, Tokyo Institute of Technology, 6-23-6, N1-13, Ookayama, Meguro-ku, Tokyo 152-8550, JAPAN

[1]Email address: biddinika.m.aa@m.titech.ac.jp

Abstrak. *Pengukuran profil kecepatan aliran di daerah dekat dinding (near-wall region) menjadi tantangan para peneliti bidang mekanika fluida, khususnya untuk aliran turbulen. Lapisan batas turbulen (turbulent boundary layer) menjadi lapisan yang menarik karena disitu terjadi fenomena sweep dan ejection yang berpengaruh misalnya pada perpindahan panas dari kelongsong bahan bakar nuklir ke fluida pendinginnya. Pengukuran dengan salah satu metode ultrasonic (ultrasonic velocity profile, UVP) dianggap cukup menjanjikan dibandingkan metode lainnya karena mampu menembus dinding atau fluida yang buram (opaque), relatif murah dan mudah pengoperasiannya dibandingkan berbagai metode pengukuran lain yang digunakan untuk mengukur di daerah dekat dengan dinding. Meski demikian, tantangan pengukuran dengan UVP muncul dari volume pengukuran yang relatif lebih besar juga. Besarnya volume pengukuran menyebabkan daerah di dekat dinding menjadi sulit untuk diukur. Oleh karenanya, tiga transduser ultrasonic dengan diameter yang berbeda-beda dicoba dibandingkan untuk mengukur aliran di daerah dekat dinding. Dari ketiganya, dibandingkan akurasi dan kemampuannya dengan menggunakan metode pdf (probability density function) untuk mengukur aliran turbulen di daerah yang dekat dengan dinding. Hasil tersebut akan memberikan gambaran korelasi antara akurasi dan kemampuan pengukuran di daerah yang dekat dengan dinding dengan ukuran diameter transduser ultrasonic-nya.*

Kata Kunci: metode UVP, aliran turbulen, daerah di dekat dinding aliran, volume pengukuran

Kategori: *Applied Sciences/Engineering*

Media Presentasi: Presentasi Oral

Daftar Pustaka

Jurnal

[1] Willmarth, W.W. and Lu, S.S. (1972). "Structure of the Reynolds stress near the wall". *Journal of Fluid Mechanics.*, 55(1), pp. 65-92.

[2] Richter, S. and Aritomi, M., 2002. "A New Electrode-mesh Tomograph for Advanced Studies on Bubbly Flow Characteristics". *JSME International Journal Series B Fluids and Thermal Engineering*, *45(3)*, pp. 565-576.

[3] Takeda, Y., 1995. "Velocity Profile Measurement by Ultrasonic Doppler Method". *Experimental Thermal and Fluid Science, 10*, pp. 444-453

[4] Wallace, J.M. and Brodkey, R.S., 1977. "Reynolds stress and joint probability density distributions in the u-v plane of a turbulent channel flow". *The Physics of Fluids, 20(3)*, March, pp. 351-355

[5] Taishi, T., Kikura, H., Aritomi, M., 2002. "Effect of the measurement volume in turbulent pipe flow measurement by the ultrasonic velocity profile method (mean velocity profile and Reynolds stress measurement)". *Experiments in Fluids, 32*, pp. 188-196

Studi Eksperimental dan Simulasi Numerik Perilaku Elastis Logam Selular *Aluminum Alloy Foam*

(Study on Elastic Behavior of Aluminum Alloy Foam by Experiment and Numerical Simulation)

Farid TRIAWAN[*], Tadaharu ADACHI, Kikuo KISHIMOTO,

Kazuaki INABA, Tohru HASHIMURA

[*] *Department of Mechanical Sciences and Engineering, Tokyo Institute of Technology,*

2-12-1 Ookayama, Meguro-ku, Tokyo 152-8552, Japan

Alamat e-mail: triawan.f.aa@m.titech.ac.jp

Abstrak. *Beberapa tahun belakangan ini, logam selular mulai banyak digunakan dalam berbagai industri teknik mulai dari industri otomotif, struktur bangunan, sampai dengan pesawat antariksa [1]. Dalam melakukan proses desain teknik untuk aplikasi-aplikasi tersebut, mutlak dibutuhkan pengetahuan yang rinci serta akurat tetang sifat dan perilaku mekanik suatu bahan. Pada penelitian ini, kami melaporkan hasil studi perilaku elastis logam selular bernama Aluminum Alloy Foam dengan melakukan beberapa uji mekanik dan simulasi numerik. Penelitian difokuskan pada modulus elastisitas lentur yang sampai saat ini belum dapat diukur secara akurat.*

Berdasarkan hasil eksperimen, modulus elastisitas lentur yang diperoleh melalui uji getaran memperlihatkan nilai 3 – 4.5 kali lebih besar dibanding modulus elastisitas Young yg diperoleh melalui uji tekan dan tarik. Fenomena ini secara teori tidak pernah terjadi pada logam padat biasa. Dengan memanfaatkan persamaan kekakuan bahan-selular [1] serta metode curve-fitting, ditemukan bahwa fenomena ini terjadi karena perbedaan mekanisme deformasi-lokal sel antara saat mengalami beban tekan/tarik dan lentur. Lebih jauh lagi, lendutan tepi-sel (cell-edge bending) merupakan faktor utama penyebab berbedanya nilai kekakuan ini. Dengan metode element hingga, pengaruh lendutan tepi-sel terhadap nilai kekakuan berhasil diklarifikasi (Gambar 1). Selain itu, ditemukan pula bahwa pengaruh lendutan tepi-sel dapat mencapai nilai maksimum pada suatu densitas relatif (relative density) tertentu.
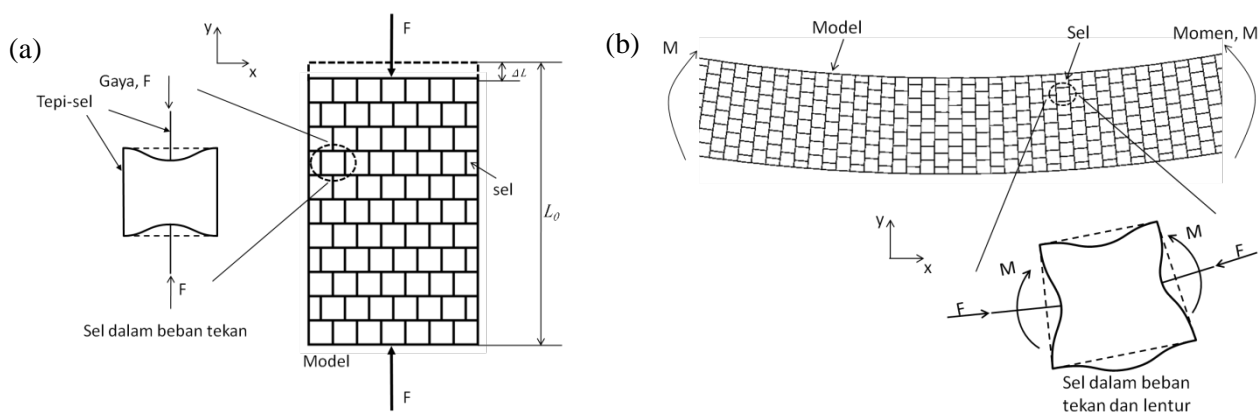
Gambar 1. Ilustrasi mekanisme deformasi-lokal sel. (a) Dalam beban tekan: bagian atas dan bawah tepi-sel melendut. (b) Dalam beban lentur: keempat tepi-sel melendut.

Kata kunci: Logam Selular, Modulus Elastisitas Young dan Lentur, Getaran, Metode Elemen Hingga

Kategori: *Applied Sciences/Engineering*

Media Presentasi: Presentasi Oral

Daftar Pustaka

[1] Ashby, M.F., A.Evans, Fleck, N.A., Gibson, L.J., Hutchinson, J.W., and Wadley, H.N.G., *Metal Foams, A Design Guide*, Butterworth-Heinemann, Oxford, UK, 2000.

Design and Control of a Cascade Multilevel STATCOM for Reactive Power Control and Fault-Ride-Through Capability

Akhmad Syaiful Hidayat
Akagi & Fujita Laboratory, Tokyo Institute of Technology
email : akhmad.syaiful@gmail.com

Abstract. *Excessive reactive power in electrical system has becomes one factor that contribute to the power quality problems. The excessive value of reactive power brings lack of efficiencies, reduce the power factor, and voltage drop in electrical system. Reactive power compensator has function mitigating the effect of excessive reactive power as well as improving power quality. Several kinds of reactive power compensator have been created with Static Synchronous Generator (STATCOM) paying more attention.*

STATCOM afford to solve power quality problems combining between circuit design and control method. The circuit design commonly employs converter switching, capacitor as energy storages, and line-frequency transformer. However, uses the multilevel converter into STATCOM, called cascade multilevel STATCOM, bring advantages that can omit a costly, bulky, and heavy line-frequency transformer, easy enables the modularity of packaging, and higher voltages into operation. In another hand, uses multilevel converter into STATCOM require split capacitor in each cell that causes voltage unbalance problems. Nevertheless, with proper and accurate control method, cascade multilevel STATCOM has ability to overcome the voltage unbalance and perform reliable operation.

This paper describes the control and design of cascade multilevel STATCOM for reactive power control. Moreover, this paper also describe the ability of cascade multilevel STATCOM to perform fault-ride-through capability to mitigate voltage sag as one part of electrical faults. With multilevel configuration, cascade multilevel STATCOM allowed to utilize H-bridge converter and split capacitor in each cells into design. The control methods consist of reactive power and capacitor voltage control combining with capacitor voltage balancing control. The capacitor voltage balancing control consists of cluster voltage balancing, and individual voltage balancing control. The control methods have function to adjust reactive power, balancing the capacitor voltage as well as perform the reliability of operation through electrical fault.

The simulation has carried out to proof the operation of a cascade multilevel STATCOM employed 6-cells in star configuration with 15kVA rating of reactive power. Through simulation, cascade multilevel STATCOM has shown the ability to adjust reactive power during the steady state and transient condition. While in the same time it also control the voltage of capacitor voltage kept balanced and controlled for each cell and cluster. Moreover, it has ability to perform fault-ride through capability to mitigate the electrical fault when voltage sag appears up to 50%. The control method has succeeded to derive the capacitor voltage kept balanced as individual and cluster in a short period after voltage sag appeared.

This result shown the ability of cascade multilevel STATCOM to improve power quality of electrical system by manage the amount of reactive power. It also shows the ability to perform the fault-ride through for the voltage sag.

Keywords: STATCOM, reactive power compensator, fault-ride-through capability

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation
Selected References:

[1] J. Dixon, L. Moran, J. Rodriguez, and R. Dunke, "Reactive Power Compensation Technologies, State-of-the-Art Review", Proc. IEEE, vol. 93, no. 12, pp. 2144-2164, 2005.

[2] B. Singh, R. Saha, A. Chandra, and K. Al-Haddad, "Static Synchronous Compensator: A Review", IET Power Electronics, vol. 2, no. 4, pp. 297-324, 2009.

[3] T. Yoshii, S. Inoue, and H. Akagi, "Control and Performance of a Medium-Voltage Transformerless Cascade PWM STATCOM with Star-Configuration", in Conf. Rec. IEEE-IAS Ann. Meeting, pp. 1716-1723, 2006.

[4] H. Akagi, Y. Kanazawa, and A. Nabae, "Instantaneous Reactive Power Compensators Comprising Switching Devices Without Energy Storage Components", IEEE Trans. Ind. Appl., vol.20, no. 3, pp. 625-630, 1984.

[5] R. E. Betz, T. Summers, and T. Furney, "Symmetry Compensation using a H-Bridge Multilevel STATCOM with Zero Sequence Injection", in Conf. Rec. IEEE-IAS Ann. Meeting, pp. 1724-1731, 2006.

Evacuation Route as Tsunami Disaster Management Planning Based on Tsunami Inundation Hazard Scenario Simulation Map Using Remote Sensing and Geographic Information System; Study Case Parangtritis Coastal Area, Bantul Regency, Indonesia

Ratih.F.P[1], J.Tetuko.S.S.[2], D. Mardiatno [3], F.Nishio[4]

[1] **Double Degree Master Programe, Center for Environmental Remote Sensing Chiba University – Japan**
[2,4] **Center for Environmental Remote Sensing Chiba University – Japan**
[3] **Research Center For Disaster, Gadjah Mada university, Indonesia**

Email address: ratihfitriaputri@graduate.chiba-u.jp

Abstract. *Parangtritis is located on the coastal area of Bantul District, Yogyakarta Province, Indonesia. This area is considered as high vulnerable area due to tsunami. The coastal area of Parangtritis has multi-land use purposes, as tourism, residential, and agricultural areas which leading to the vulnerable area to tsunami hazard. This research is aimed at analyzing the tsunami hazard impact and making risk disaster management of this hazard. This research uses four scenarios of direction, i.e. wave from west, south-west south, and south east. This research also uses six scenario of run-up, i.e. 5 m, 10 m, 15 m, 20 m, 25 m, and 30 m. The superimposed technique between hazard model, agricultural and non agricultural land use map will be carried out to have the understanding of the potential impact of tsunami to agricultural land production. The research revealed that the coastal area of Bantul is very vulnerable to tsunami hazard. Tsunami is a natural phenomenon which cannot be prevented; however, this does not imply that no one should live in coastal areas. It is very important to maximize the mitigation effort in order to minimize the negative impact from the natural disaster.*

A remotely sensed approach in combination with the Geographic Information System (GIS) might be more useful for establishing the spatial extent of potential hazard inundation[1][2] as well as to calculate the spatial agricultural damage over large area[3]. Nowadays, the technology of the satellites images are increasing rapidly in term of the technology development and technology application. As example, data acquired by satellite sensors for land use determination, especially at coastal agricultural land use, is becoming an increasingly important source of information for precision farming. Digital Image Processing methods used to produce hill shade, slope, minimum and maximum curvature maps based on SRTM DEM contribute to the detection of morphologic traces. These maps combined with Landsat ETM and seismo-tectonic data in a GIS database allow the delineation of coastal regions can be useful for Tsunami analysis. This paper reports the results of an assessment of the impact of tsunami inundation for a coastal segment of Parangtritis. This study has been undertaken for three reasons: (1) the Parangtritis coastal area is one of the most vulnerable areas due to tsunami and has been identified as an area at risk from future tsunami occurrence; (2) this research will predict and make tsunami inundation hazard scenario simulation in research area; (3) Furthermore, to our knowledge, coastal land-use planning in general fail to considered the potential role of the extreme hazard facing on the coastal area.

Bantul Local government cooperation with Yogyakarta Central Government has been install siren systems in Parangtritis area where the vulnerable area of tsunami. Those completed systems are: 6 Public addresses, 1 tower, 1 amplifier and 1 receiver. This system install in 8 different locations with connecting in a repeater which place in hilly then correlate with active system in Head of local government Bantul. This system is based on radio analogue technology with FM wave. The other advantages of this system beside give siren for evacuation are also give information what the kind of earthquake which can trigger a tsunami. Bantul local government have organized the commercial place for local people in higher place and safe from tsunami and have also figure out Tsunami drill to face tsunami hazard.

An emergency evacuation place on the way to a hill top is effective for saving lives. The height of the place should be higher than the expected tsunami. In case of tsunami at midnight, it will be much more dangerous for the villagers to evacuate, because of the complete darkness without electricity, so indications

to let them know the evacuation route should be considered. For successful evacuation, therefore higher evacuation places than the expected tsunami should be set in and/or near residential areas. There are two alternative paths disaster evacuation for this area, evacuation path to the Yogyakarta city and evacuation path to the mountain area on the east side of area which is the more save zone from the tsunami disaster. The city area can be reach by the road way. Meanwhile the mountain side can be reach by road way and the footpath which is well known by local people. Tsunami inundation impact of Parangtiritis coastal area will be needed special safety handling and supervising for holiday and special events due to the high tourist visitors come, can be in thousands visitors on these days. Every visitor has difference preference on the place along the beach but based on this research, area that within around SAR post, this area more density than others. For hazard zone tsunami can be concluded that only when the height 10 m the very danger situation came that threat all the houses and population on that area. Physical damage due to tsunami 2006 was not as big as Pangandaran, but the awareness for possibility repetition or the bigger tsunami disaster come must be exist, Parangtritis categorized as vulnerable area to tsunami.
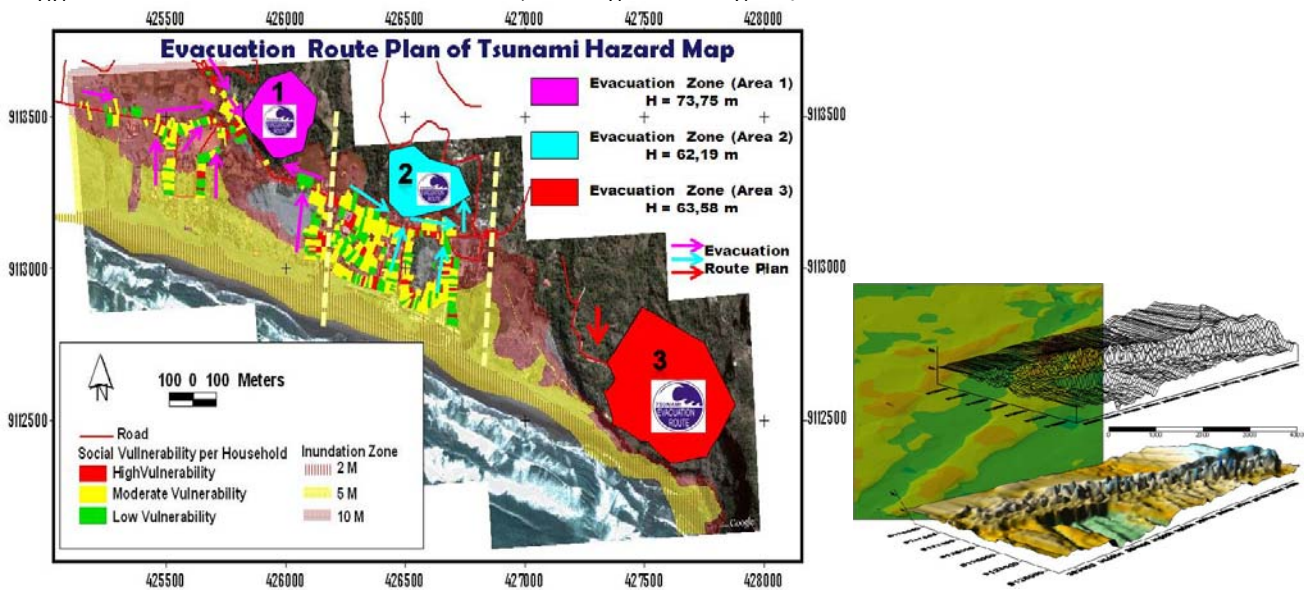
Figure Evacuation Route Plan of Tsunami Hazard Map as Disaster Management Planning

Keywords: *Evacuation Route, Disaster Management Planning, Tsunami Inundation Hazard Scenario Simulation, Remote Sensing & Geographic Information System*

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References
[1] Lavigne F, Gomez C, Gifo M, Wassmer P, Hoebreck C, Mardiatno D, Priyono J, Paris R. (2007). Field observations of the 17 July 2006 Tsunami in Java. *Nat Hazard Earth Syst Sci* 7(1):177–183.
[2] Marfai MA, King L. (2008a). Tidal inundation mapping under enhanced land subsidence in Semarang, Central Java Indonesia. *Natural Hazards* 44: 93-109.
[3] Marfai MA, King L. (2008b). Potential vulnerability implications of coastal inundation due to sea level rise for the coastal zone of Semarang City, Indonesia. *Environmental Geology* 54:1235-1245.

Implementation Naked Object Detection on Firefox Internet Browser using Cascade of Boosted Classifiers Based on Haar-Like Features Algorithm

Rizqi Putri Nourma Budiarti[1], Mochamad Hariadi[2], Sritrusta Sukaridhoto[3], Nobuo Funabiki[4]

[1, 2]Institut Teknologi Sepuluh Nopember Surabaya, [3]Electrical Engineering Polytechnic Institute Surabaya, [4]Okayama University Japan

Email address: putri@goodle.or.id, mochar@ee.its.ac.id, dhoto@ieee.org, funabiki@cne.okayama-u.ac.jp

Abstract. *The spread of pornography has been more facilitated by the Internet trough Internet browser application. However, the main vulnerabilities use of Internet browser is the lowest protection against porn content. Nowadays, only text based blocking has been used in Internet browser. In this research, our contribution is web browser extension that can prevent from accessing porn site based on image processing. The method to detect the porn images is using "Cascade of Boosted based on Haar-Like Features" algorithm, we implemented this algorithm by using OpenCV programming. We use shell scripts, XUL and DOM programming based on Javascripts to embed porn image detection application into Firefox browser. This Firefox browser extension has been successfully implemented, and can achieved to detect 100 porn pictures sequentially about 8 seconds on the localhost machine and 35 seconds on the Internet.*

Keywords: Firefox browser extension, Haar-Like Features, Naked Object Detection.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

Books
[1]. "The Science Behind Pornography Addiction" – presented on the Senate Subcommittee on Science, Technology and Space on November 18, 2004.
[2]. Janis Wolak, JD, Kimberly Mitchell, PhD and David Finkelhor, PhD (2005). Crimes against Children Research Center, University of New Hampshire, Durham, New Hampshire. A telephone survey of a nationally representative sample of 1500 youth Internet users aged 10 to 17 years was conducted between March and June 2005.
[3]. "Add-ons for Firefox", https://addons.mozilla.org/en-US/firefox/ (Accessed at July 10, 2010)
[4]. Tutorial: OpenCV haartraining (Rapid Object Detection With A Cascade of Boosted Classifiers Based on Haar-like Features) – Naotoshi Seo", http://note.sonots.com/SciSoftware/haartraining.html (Accessed at July 10, 2010).
[5]. Dadet Pramadihanto, Sritrusta Sukaridhoto, Muhammad Fatoni A, Rudy Cahyadi. "Sistem Pendeteksi Gambar Porno", Prosiding Seminar Nasional Open Source Software ke-2 2007.
[6]. Gary Bradski and Adrian Kaehler. (2008). "Learning OpenCV: Computer Vision with the OpenCV Library", O'reilly.
[7]. Kennetc C. Feldt. (2007). "Programming Firefox", O'reilly.

Effects of Land Use Planning in *Perpres* 54/2008 on River Discharges

Miga M. Julian*[1,2], F. Nishio[2], Poerbandono[3], Philip J. Ward[4]

[1] **Study Program of Geodesy and Geomatics Engineering, Institute of Technology Bandung, Indonesia**

[2] **Center for Environmental Remote Sensing, Chiba University, Japan**

[3] **Faculty of Earth Science and Technology, Institute of Technology Bandung, Indonesia**

[4] **Institute for Environmental Studies, Faculty of Earth and Life Science, VU University Amsterdam, Netherlands**

[*]Email address: miga.m.julian@graduate.chiba-u.jp

Abstract. *In 1995, the population in Jakarta, Bogor, Depok, Tangerang and Bekasi (Jabodetabek) has reached more than 20 million and is still rising since then [1]. The rate of population growth in Jabodetabek throughout 1980 to 1995 was 69.5%. This leads to conversion of forest and agricultural zone into residential that decreases infiltration rate and causes fresh water to more easily flow to the sea. In 2008, a presidential regulation number 54 (Peraturan Presiden Nomor 54 Tahun 2008 - Perpres 54/2008) was issued. Land use planning covering Jabodetabek appeared in this Perpres (see Fig. 1). This study is intended to investigate the effects of land use planning in Perpres 54/2008 on river discharges. The investigation is based on spatial simulation. Only the Ciliwung and Cisadane watersheds are considered. Three evaluation points for each watershed are investigated (see Fig. 1): downstream, middle and upper watersheds. The same study has successfully been done and documented in [2]. In the latter, it was applied at a 1km×1km resolution, using actual land use for 2004. Here, we simulate the discharge at 100m×100m resolution with updated land use data (i.e. 2007).*
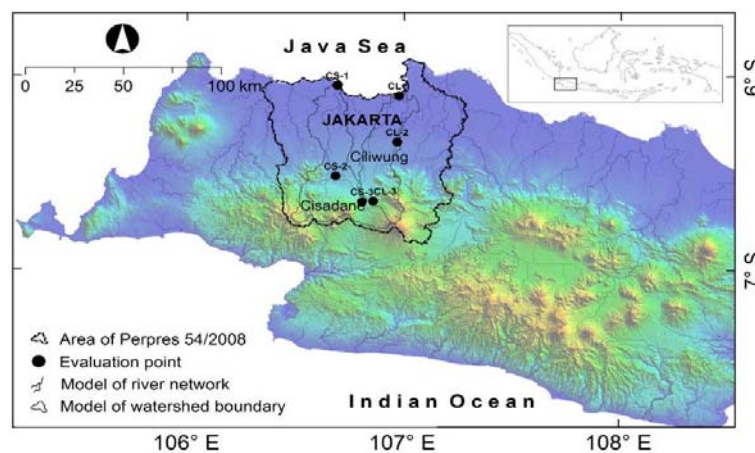
Fig. 1. Study site

A calibrated spatial water balance model named STREAM (Spatial Tools for River Basins and Environmental and Analysis of Management Option) is used for river discharge simulation [3,4]. The inputs of this model are climate data (precipitation and temperature), land use and topography. Two scenarios of land use were used (i.e. land use according to Perpres 54/2008 and the actual one). The actual land use is generated on the basis of interpretation of MODIS imagery from 2007. The ASTER Global DEM is used to delineate model of river network. Climate data (monthly average precipitation and temperature) are provided by Climate Research Unit (CRU) (CRU CL 2.1).

Fig. 2 shows the simulated discharges across selected evaluation points in the Ciliwung and Cisadane watersheds. Higher discharge usually occurred from January to April. We can see that the simulated discharges decrease under Perpres scenario, with the largest decrease in the downstream area. The decreases in discharge are respectively 0.1%, 0.8% and 2.2% (upper, middle and downstream of Citarum), and 4.4%, 4.7% and 5.6% (upper, middle and downstream of

Cisadane). The overall effect of land use planning according to Perpres 54/2008 reduces river discharge by 0.1% to 5.6%.

(a) Downstream of Ciliwung (CL-1)   (b) Middle of Ciliwung (CL-2)   (c) Upper of Ciliwung (CL-3)

(d) Downstream of Cisadane (CS-1)   (e) Middle of Cisadane (CS-2)   (f) Upper of Cisadane (CS-3)
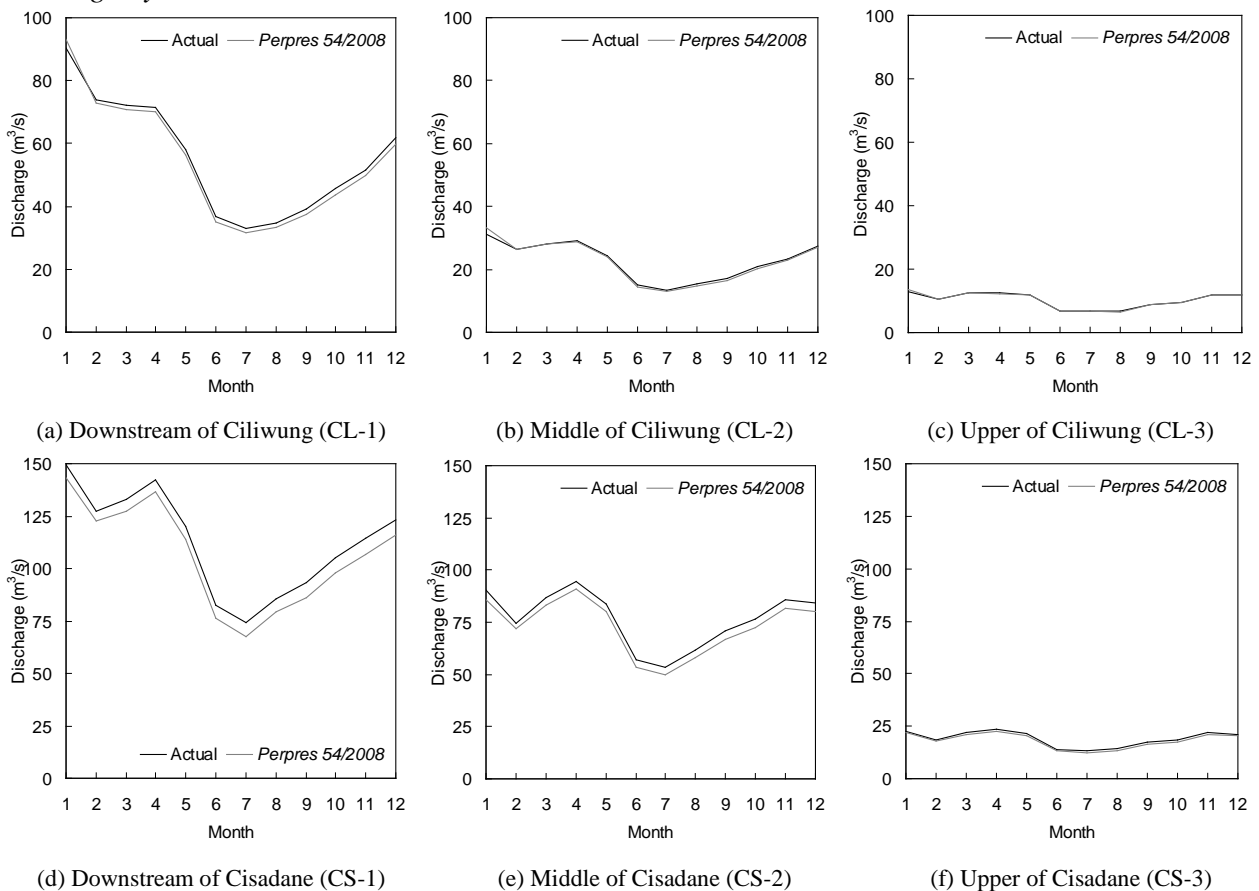
Fig. 2. Simulated discharges in selected evaluation points

Keywords: River discharge, Jabodetabek, Land use planning, *Perpres* 54/2008

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References
[1] Cybriwsky, R. and Ford, L.R. (2001). "City profile Jakarta", *Cities Vol. 18*, No. 3, 199-210.
[2] Poerbandono, Ward, P.J. Julian, M.M. and Harto, A.B. (2009). "Spatial simulation of watershed response across Jakarta to the prevailing rainfall climate according to effective enforcement of *Perpres* 54/2008", *International Conference on Regional Development, Environment and Infrastructures "Trend, Issues and Challenges Confronting Regional Development, Infrastructure and Environment in Developing Countries"*, Bandung, Indonesia.
[3] Aerts, J.C.J.H., Kriek, M. and Schepel, M. (1999). "STREAM, Spatial Tools for River Basins and Environment and Analysis of Management Options: 'Set Up and Requirements'", *Physics and Chemistry of the Earth Part B*, 24(6), 591-595.
[4] Poerbandono, R. Ward, P.J. and Julian, M.M. (2009). "Set Up and Calibration of a Spatial Tool for Simulating River Discharge of Western Java in Recent Decades: Preliminary Results and Assessments", *ITB Journal on Engineering Science Volume 41*, No. 1, 50-64.

Surface functionalization of a qDMAEMA monomer onto hollow fiber PES membrane by photografting polymerization

Fachrul Razi[1,2], Isao Sawada[2], Hideto Matsuyama[2]

[1] Dept. Chem. Eng, Syiah Kuala University, Banda Aceh, Indonesia

[2]Center for Membrane and Film Technology, Dept. Chem. Sci. and Eng., Kobe University, Japan

fr_razy@yahoo.com

Abstract. *Surface modification of hollow fiber polyethersulfone (PES) membrane by means of UV irradiation induced graft surface functionalization of quaternary 2-dimethylaminoethyl-methacrylate (qDMAEMA) was studied. The grafted layer of qDMAEMA monomer on the PES membranes surfaces were characterized by using ATR-FTIR, and the chemical composition of grafted layer were analyzed by XPS. The performances of modified PES membranes, namely PES-g-qDMAEMA were performed in term of anti fouling property by filtration of bovine serum albumin (BSA) as protein-model solution and in term of anti bio-fouling property against E.coli pure culture suspension. The SEM results showed that the outer surface of modified PES membrane was slightly covered by grafted layer of qDMAEMA. The grafted of qDMAEMA was improved the hydrophilicity of modified PES membrane, and the surface functionalized of PES membranes with quaternary ammonium (QA) units of qDMAEMA monomer provided the higher anti-fouling property when they were exposed to BSA solution than that of the original PES membranes. Shaking-flask test also revealed that PES-g-qDMAEMA membrane with grafting amount of 4.8 mg/cm^2 showed higher anti bio-fouling which was almost 99,9% of bacteria were killed upon contacted to PES-g-qDMAEMA membrane. Thus, surface functionalization of qDMAEMA monomer onto the PES membrane could improve antifouling and as well as anti bio-fouling property of hollow fiber PES membrane.*

Introduction: *Surface modifications have been studied extensively for improvement of membrane hydrophilicity by photo-grafting of functional monomers on the base membrane surface using UV irradiation [1]. This process has several advantages such as low cost of operation, mild reaction condition and absorption of UV light without affecting the bulk polymer of base membrane [2, 3]. Thus, this study was aimed to improve both antifouling and antibacterial property of polyethersulfone (PES) membrane by surface functionalization of quaternary 2-dimethylaminoethylmethacrylate (qDMAEMA) monomer onto membrane surface.*

Experimental: *A porous hollow fiber PES membrane was coated with benzophenone (BP), thereafter was placed into a quartz-vessel that containing a monomer solution of qDMAEMA and irradiated by using UV irradiation for a designated time. The grafting amount (GA) of modified PES, namely PES-g-qDMAEMA membrane was determined as the weight gain of PES membrane per outer surface area. Water contact angle was measured to check the hydrophilicity of PES-g-qDMAEMA membrane. The performances of PES-g-qDMAEMA membranes were evaluated in term of antifouling and anti-biofouling by means of filtration of Bovine Serum Albumin (BSA) solution, and shake flask test by exposing the PES-g-qDMAEMA membrane to Escheria coli pure culture suspension.*

Results and discussion: *The surface morphology of original PES membrane and PES-g-DMAEMA membrane was observed by FE-SEM, as shown in Figure. 1. It can be seen that the outer surface of original PES 30 kDa (Figure 1a) membrane had dense structure which is almost no macro porous was observed on the membrane surface, while original PES 150 kDa membrane (Figure 1b) had macro porous structure. However, for PES 150 kDa-g-qDMAEMA (Figure 1c) shows that the membrane pore became small and slightly reduced when comparing to original PES 150 kDa membrane. This was attributed to the existence of grafted layer of qDMAEMA monomer. The main characteristic of qDMAEMA monomer is specified by a quaternary ammonium (QA) unit on their backbone structure. Such kinds of this monomer are very hydrophilic and water-soluble monomer. Thus, the grafted of qDMAEMA on the PES membrane surface*

could improve the membrane surface hydrophilicity and it was also to be useful for reduction of membrane fouling.
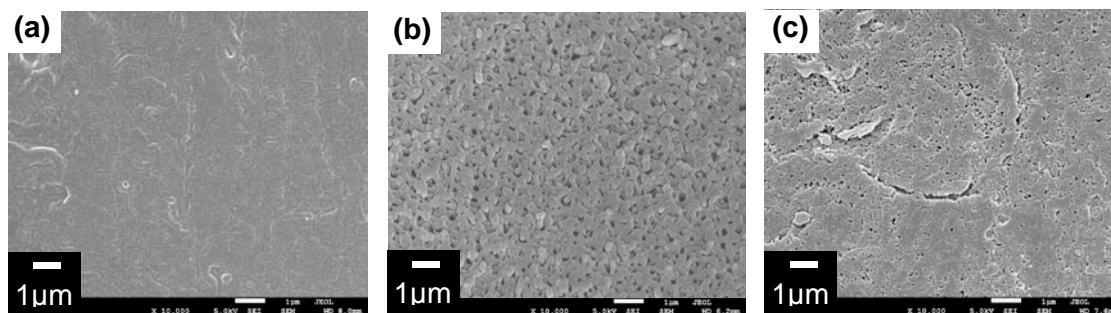
Figure 1. SEM images (outer surface) of original and grafted PES membranes;
(a). PES 30 kD; (b). PES 150 kD and (c). PES 150 kD-g-qDMAEMA (GA: 3.7 mg/cm^2)

Keywords: Surface functionalization, grafting amount, quaternary ammonium (QA), hallow fiber PES membrane, antifouling property, anti bio-fouling property.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Deng, J., Wang, L., Liu, L., Yang, W. (2009). "Developments and new applications of UV-induced surface graft polymerizations." *Prog in Poly. Sci.,* 34(2), 156-193.

[2] Yu, H. Y., Xu, Z. K., Yiang, Q., Hua, M. X., Wang, S. Y. (2006). "Improvement of the antifouling characteristics for polypropylene microporous membranes by the sequential photoinduced graft polymerization of acrylic acid." *J. Membr. Sci.,* 281(2), 658-665.

[3] He, D., Susanto, H., and Ulbricht, M. (2009). "Photo-irradiation for preparation, modification and stimulation of polymeric membranes." *Prog in Poly. Sci.,* 34(1), 62-98.

Drying Performance of Solar-Biomass Hybrid Dryer for Rosella

Dyah Wulandani[1], Edi Sutoyo[2], Guyup Mahardhika[2]

[1]**Department of Agricultural Engineering, Bogor Agricultural University, Indonesia**
[2]**Graduate Student, Bogor Agricultural University, Indonesia**

Email:dyahwulandani@yahoo.com

Abstract. *The rack type solar-biomass assisted dryer of Rosella has been designed, constructed and evaluated. The objective of the research was to define the drying performance of solar-biomass hybrid dryer especially for rosella drying. Rosella (Hibiscus sabdariffa) is a kind of medicine plant which can be served in the delicious beverages like tea. Prenesti et al. [5], has found the polyphenols content in the rosella which serves as the antioxidant. Antioxidants are widely used as ingredients in dietary supplements in the hope of maintaining health, anti-aging and preventing diseases. The decoction of rosella provides the highest polyphenols content and the highest antioxidant power. In order to maintain the quality of rosella stored for a long time, dried rosella to be one the option. It is usual to see, particularly in Indonesia, in the countryside, food or grain spread on the ground such as cacao, tobacco leaf slices, clove, candied fruit (papaya, mango, orange peel), rosella tea etc., exposed to the sun in order to be dried. However, this method has many disadvantages. It depends on climatic conditions, and requires a large surface and a long time of exposure to sun light and, in particular, to ultraviolet rays. This leads to deterioration of the dried product. Furthermore, this method does not enable the drying of large quantities and in the open circumstance, the drying product, especially which was purposes to drying food product, could be contaminated with impurity or pathogen bacteria. Solar hybrid dryer was designed and tested to overcome those matters. Products were kept in racks within the transparent building, to spare them from raining, fly or another contaminant. The transparent wall at once was used to trap and gain sun shine heat resulted the increasing of temperature in the drying chamber [2].*

The major components of the dryer are rectangular building and rack within the building, solar collector, solar concentrator and burner (biomass additional heater). Dimensions of drier were height of 3 m, width of 1.8 m, and length of 4.5 m. The transparent wall and black painted iron frame of dryer were fixed as solar collector in order to gain the sun shine heat. The dryer consists of two parts of drying chamber connected in parallel with a total dimension of length 4.5 m, width 1.8 m and height 3 m. Each of chambers were provided by two solar concentrators with a total area of 4.2 m². Water heated by solar concentrator was used as heating energy source for rosella drying. Additional heating from burner (biomass energy) was used when rainy or night-drying was needed. The solar concentrators rotated at a perpendicular to the sun ray direction to allow for maximum hours (about 8/day) of sun-ray interception.

Dryer full capacity was 400 kg of rosella pod. The dryer was tested in three modes of operation; daylight-without product, night-without product and daylight-with product of fresh rosella pod was weighing about 32 kg. The experiment was done between 08:00 and 16:00. Fresh rosella used in this study were obtained from Department of Agricultural Engineering (IPB) field laboratory during the rainy season (December 2009). Rosella was ripe and well-colored (purple-red). The initial moisture content of rosella pod was determined by using the oven drying method at 70ᵒC for 24 hour [1]. Solar irradiation reflects the weather conditions were monitored during the drying process. Temperatures measured comprised the temperature of; drying air, ambient, product, water inside the solar-collector-heat-exchanger and air inside the burner-heat-exchanger.

The study resulted of the experiment 1 (daylight-without product) showed the uniformity of drying air temperature within the chambers, that was indicated by standard deviation of drying air temperature of 3.3ᵒC. Uniformity of drying temperature gives significant effect for the best quality of dried product. The experiment was undertaken at cloudy weather with average solar irradiation about 95.3 W/m². In this case, fire wood (caloric value of 19 MJ/kg) was burned at combustion mass rate of 5 kg/h as addition heating energy to increase the drying temperature became 60ᵒC from the ambient temperature of 30.6ᵒC.

The night operation of dryer got the uniformity of drying air temperature twice less than that of daylight mode operation (experiment 1). For this case, the experiment evinced that solar energy has an important role to contribute the uniformity of drying temperature in the dryer. The dryer required the combustion mass rate about 9 kg/h to gain the drying temperature of 51.8°C at ambient temperature of 24°C.

Drying performance of the solar-biomass hybrid dryer was pronounced by the efficiency value of rosella drying of 30 % that was obtained from the experiment 3 (daylight-with product of fresh rosella pod). As a comparison, Othman et al. [4] got the drying efficiency of flat-plate-collector solar dryer in the range of 20 % to 60 %. Fresh rosella was dried from initial moisture content of 89.9 % wet basis to 12.3 % wet basis during 28 hours (4 days) at average of drying temperature of 43°C and ambient temperature of 32°C. The drying was done for 52 % relative humidity and 0.39 kg/s air mass flow rate. The temperature values of drying chamber air were found to be in the range of 34°C to 55°C. The drying process occurred at overcast condition which was represented by average of solar irradiation values of 46 W/m². Firewood combustion was used as additional heating energy at combustion mass flow rate of 2.5 kg/h. Energy consumption of rosella pod drying was still high about 49 MJ/kg of water evaporated from product, due to heat loses at the burner. By comparison, Frima [3] reported the energy consumption of rice drying of 11 MJ/kg of water evaporated from product. Based on the quality analyses by visual method, the rosella pod dried at a temperature of 43°C was found to be in an acceptable property. Steeping of Rosella tea was served only in a few minutes (3-5 minutes). Economical analyses by using Break-even point analyses and Net Present Value method denoted that the dryer was feasible with the assumption the dryer was operated at the full capacity of rosella pod (400 kg). Pay-back period occurred at one year operation with the cost of drying was Rp500,- per kg of fresh rosella pod.

Keywords: Dryer, rosella, solar dryer, biomass, hybrid dryer, drying performance.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Anonymous, (1981). *ASHRAE Handbook of Fundamentals*, New York .

[2] Duffie J. A. and Beckman W. A,.(1991). *Solar Engineering of Thermal Process,*. John Wiley, New York .

[3] Frima, A.N., (2008). Design of dryer using Flat Plate Collector and Water Heater as Energy storage for Rice Drying. Thesis. Bogor Agricultural University. (In Indonesian)

[4] Othman, M.Y.H., Sopian, K., Yatim, B., Daud, W.R.W. (2006). *Development of advanced solar assisted drying systems.Renewable Energy* 31: 703–709

[5] Prenesti E.*, S. Berto, P. G. Daniele, and S. Toso. (2007). *Antioxidant power quantification of decoction and cold infusions of Hibiscus sabdariffa flowers*. Food Chemistry 100, 433–438

Solar Radiation Effect on Long-term Performance
of Bridge Rubber Bearings

Paramashanti[1], Yoshito ITOH[1]

[1]Department of Civil Engineering, Nagoya University, Japan

Email address: parama@civil.nagoya-u.ac.jp

Abstract. *Rubber has a long history of applications in base-isolators of bridge due to its special properties such as high elasticity and large elongation at failure. Rubbers can be deteriorated by oxygen, ozone, heat, light, oil, and other liquids. Physical properties of rubbers may change as a result of the degradation process over time, called aging. A series of accelerated exposure tests were performed by Itoh et al.[1), 2), 3), 4)] on various rubber materials to investigate the degradation effects of different environmental factors. It was found that the thermal oxidation is the most predominant degradation factor affecting the rubber material of bridge bearings. The equivalent shear stiffness of a bridge rubber bearing increases over time due to the deterioration of rubber, and the higher the rubber temperature, the faster it increases. In the current design specifications, the stiffness increase of rubber bearings due to aging is not considered. To accurately evaluate future seismic performance of a base-isolated bridge and to secure the safety of the bridge against the earthquake, it is important to consider the aging effect of rubber bearings. Moreover, with understanding of long-term performance of rubber bearings, an appropriate maintenance strategy for a life span of the bridge can be determined at the initial planning phase, which can avoid unnecessary maintenance and replacement costs.*

Itoh et al.[4)] proposed formulas to estimate the increase in the equivalent stiffness of rubber bearing due to aging. For the bearing size of 400 mm x 400 mm, the increase in the equivalent shear stiffness of an NR bearing in Naha where the yearly average ambient temperature is 22.7˚C reaches 26% of the initial stiffness, while in Sapporo with the average temperature of 8.5 ˚C, the increase is about 15%. In the current prediction, the yearly average ambient temperature is used, assuming that rubber in the bearing has the same temperature as its surrounding ambient temperature because rubber bearings are thought to be usually in the shadow as they are installed between superstructure and substructure. However, in the actual environment, there are many bearings that are exposed to solar radiation that causes bearing temperature to increase.

The objectives of this study are to (1) evaluate the effect of solar radiation on the bearing surface temperature, (2) evaluate the effect of solar radiation on the internal bearing temperature, and (3) investigate the long-term performance of rubber bearing by considering solar radiation effect on bearing temperature.

To evaluate the effect of solar radiation on the bearing temperature, bearing surface temperatures were measured on a bearing installed in an elevated highway in Nagoya, Japan in summer and winter seasons. Results from the field measurements show that bearing surface temperatures are always higher than the ambient temperature in both summer and winter. The difference between the surface temperature and the ambient temperature becomes significantly large when the surface receives direct solar radiation on a sunny day, and the maximum difference can be more than 20˚C. However, on the bearing surface in the shadow, the surface temperature tends to be similar to the ambient temperature as solar radiation is small, and the maximum difference is about 2 ˚C.

To accurately evaluate the long-term performance of rubber bearings that are exposed to solar radiation during the day, it is necessary to obtain the information on a temperature variation inside a bearing. In this study, an internal temperature measurement was also performed on a bearing model. Bearing internal temperature is higher than the ambient temperature in terms of daily averages when the bearing is exposed to solar radiation. For a 420 x 420 mm HDR bearing exposed to solar radiation, the maximum difference is about 7˚C.

To investigate the effect of solar radiation on long-term performance of rubber bearing, bearing temperature has to be predicted. With sufficient understanding of bearing temperatures exposed to solar radiation from the measurements, in this study, the internal bearing temperature is estimated based on heat transfer analysis by using the general purpose finite element analysis program, ABAQUS. Bearing temperature is predicted for 1 year solar radiation and ambient temperature data from Japan Meteorological Agency. For data in Nagoya for 2004 that has the average of ambient temperature of 16.8°C and average of daily total solar radiation of 14.3 MJ/m², the average internal bearing temperature resulted from the analysis is 20.2°C. By using this temperature values, the long-term performance in terms of change of bearing's shear stiffness of an HDR bearing with the size of 420 x 420 mm within 100 years is calculated. Application of the average internal bearing temperature results in the faster change of equivalent shear stiffness. After 100 years aging time, the shear stiffness of HDR bearing increases by 19% when the yearly average ambient temperature is used, while it increases by 22% when the internal bearing temperature is used. In areas where the solar radiation is large, the effect of solar radiation on long-term performance of bridge rubber bearings will be more significant. In this study a procedure to predict aging of rubber bearings and long-term performance by considering solar radiation effect is proposed, where the long-term performance will be evaluated based on data of ambient temperature and solar radiation for the bridge location.

Keywords: Rubber bearing, long-term performance, aging, temperature, solar radiation

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References
Journals

[1] Itoh, Y., Satoh, K., Gu, H. S., and Yamamoto, Y., Study on the long-term deterioration of natural rubber of bridge bearings, Journal of Structural Mechanics and Earthquake Engineering, JSCE, No.801/I-73, pp.185-196, 2005 (in Japanese).

[2] Itoh, Y., Satoh, K., Gu, H. S., and Yamamoto, Y., Study on the deterioration characteristics of natural rubber bearings, Journal of Structural Mechanics and Earthquake Engineering, JSCE, Vol.62, No.2, 2006 (in Japanese).

[3] Itoh, Y., Gu, H. S., Satoh, K., and Yamamoto, Y., Long-term deterioration of high damping rubber bridge bearing, Journal of Structural Mechanics and Earthquake Engineering, JSCE, Vol.62, No.3, pp.595-607, 2006.

[4] Itoh, Y., and Gu, H. S., Predictions of Aging Characteristics in Natural Rubber Bearing Used in Bridges, Journal of Bridge Engineering, ASCE, Vol.14 No. 2, pp. 122-128, 2009.

Simulasi Kesetimbangan Kimia untuk Menghasilkan Bahan Bakar Gas (H_2+CO) dari Proses Gasifikasi-Uap Tandan Kosong Kelapa Sawit

Adjar Pratoto[1], Slamet Raharjo[2]

[1] Jurusan Teknik Mesin, Universitas Andalas, Padang-INDONESIA

[2] *Department of Mechanical Science and Engineering, Nagoya University*, JAPAN

Email address: slamet.raharjo@e.mbox.nagoya-u.ac.jp

Abstrak. *Pada penelitian ini, dilakukan simulasi gasifikasi-uap biomassa (tandan kosong kelapa sawit) dengan menggunakan model kesetimbangan kimia. Dari hasil simulasi ini akan dianalisis pengaruh rasio mol uap/biomassa (S/B) dan suhu terhadap komposisi produk gas terutama kandungan sintesis gas (H_2+CO).*

Konversi limbah padat menjadi energi akan menyelesaikan 2 permasalah penting yang dihadapi dunia dewasa ini, yaitu masalah melimpahnya limbah dan menipisnya cadangan energi. Dengan memanfaatkan proses gasifikasi, maka limbah padat yang merupakan biomassa akan terdekomposisi secara termokimia menjadi gas bakar (H_2, CO, CH_4) yang dapat digunakan secara langsung sebagai bahan bakar pada turbin gas atau sebagai bahan baku untuk produksi bahan kimia.

Untuk simulasi digunakan variasi suhu dari $200^o C$-$1000^o C$ dan rasio mol uap/biomassa S/B: 0,5; 1,0; dan 2,0. Dari simulasi, terlihat bahwa produksi hidrogen dan carbon monoksida bertambah dengan kenaikan suhu. Pada suhu-suhu rendah, produksi hidrogen rendah dan meningkat seiring dengan kenaikan suhu hingga mencapai suatu puncak dan kemudian produksi hidrogen menurun lagi. Kenaikan rasio (S/B) akan menggeser puncak produksi hidrogen ke arah suhu rendah. Hasil yang serupa juga diamati untuk produksi karbon monoksida, tetapi karbon monoksida tidak memperlihatkan penurunan produksi pada suhu tinggi terutama pada rasio (S/B) yang tinggi. Sedangkan, profil metana tidak terlalu dipengaruhi oleh rasio (S/B). Secara umum, rasio mol S/B: 0,5 memberikan persentasi produksi syngas total (H_2+CO) tertinggi dengan kecenderungan konsentrasi CO akan semakin tinggi seiring dengan kenaikan suhu gasifikasi diatas $700^o C$. Hasil simulasi ini dapat dimanfaatkan sebagai input dalam penentuan kondisi optimum untuk experimen skala laboratorium..

Kata Kunci: gasifikasi, biomassa, sintesis gas, model kesetimbangan kimia.

Kategori: *Applied Sciences/Engineering*

Media Presentasi: Presentasi Oral

Pustaka

Buku

[1] Benson, R.S., 1977, *Advanced Engineering Thermodynamics*, [2nd] Edition, Pergamon Press, Oxford.

[2] Khadse, A., Parulekar, P., Aghlayam, P., & Ganesh, A., 2006, Equilibrium model for biomass gasification, *Advances in Energy Research*.

Jurnal

[3] Jangsawang, W., Klimanek, A., & Gupta, A.K., 2005, Enhanced yield of hydrogen from wastes using high temperature steam gasification, *Trans. ASME, J. Energy Resources Technology*.

[4] Jarungthammachote, S. & Dutta, A., 2006, Thermodynamic equilibrium model and second law analysis of a downdraft waste gasifier, *The 2nd Joint Intl. Conf. on Sustainable Energy and Environment*, Bangkok, 21 – 23 November.

[5] Melgar, A., Perez, J.F., Laget, H., & Horillo, A., 2007, Thermochemical equilibrium modelling of a gasifying process, *Energy Conversion and Management* 48, 59–67

THE EFFECTS OF CO2¬ PRESENCE ON RICE STRAW GASIFICATION

Bayu Prabowo[1], Kentaro Umeki[1,2], Tomoaki Namioka[1], Kunio Yoshikawa[1]

[1]*Tokyo Institute of Technology, 4259 Nagatsuta, Midori-ku, Yokohama 226-8502, Japan*

[2]*Royal Institute of Technology (KTH), Brinellvägen 23, SE 100 44 Stockholm, Sweden*

prabowo.b.aa@m.titech.ac.jp

Abstract. *Steam gasification is a useful method for converting carbonaceous material into a valuable syngas. However, the problem of a low thermal efficiency still prone to occur due to the waste latent heat of unreacted steam. CO_2 has prospective to be utilized as gasifying agent owing to its reactivity and availability. In order to investigate the effect of CO_2 gasifying agent on reaction characteristics, gas evolution behaviors were examined in a batch type electrically heated reactor (Fig.1). Rice straw was used as a model substance. 1.2 l min-1 flow of N_2 as a carrier gas and 0.3 l min-1 flow of CO_2 as a gasifying agent was employed, and temperature of 973 K, 1073 K, 1173 K and 1273 K was set up for the gasification test. The gas evolution rate and the gas yield profiles were analyzed and compared with the comparable data of steam and inert gasification. Differences caused by gasifying agent were shown in char gasification stage. Char gasification under the CO_2 atmosphere, was not significant up to 1173 K while the reaction under the steam atmosphere was measurable. Bouduard's reaction was detectable at 1273 K. These results indicated that CO_2 gasification requires higher reaction temperature than steam gasification. The obtained results gave a description about the energy requisite comparison which will be an important matter for the development and implementation of CO_2 gasification technology.*

Keywords: CO2 gasification, Rice straw Gasification, Bouduard`s reaction..
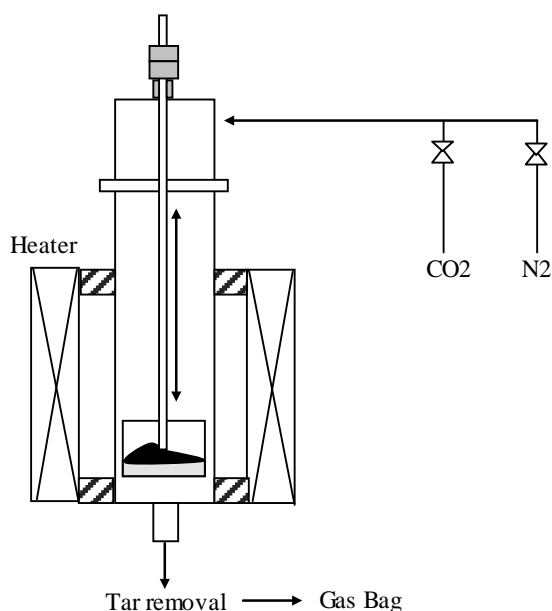
Fig.1. Experimental setup

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] K. Umeki, Modelling and simulation of biomass gasification with high temperature steam in an updraft fixed-bed gasifier, Doctoral Thesis, Tokyo Institute of Technology 2010

[2] P. L. Walker, F. Ruskino JR., L.G Austin JR., Advanced catalysis and related subjects 1959, 9: 133 – 221

[3] I. Ahmed, A.K. Gupta, Characteristic of Cardboard and Paper Gasification with CO2, Applied Energy 2009; 86: 2626 – 2634

[4] M.J. Castaldi, Solid carbon feedstock gasification using CO2 simulation and experiment, Proceeding of The International Conference on Power Engineering 2009, 277-282

[5] Y. Huang, X. Yin, C. Wu, C. Wang, J. Xie, Z. Zhou, L. Ma, H. Li, Effect of metal catalyst on CO2 gasification reactivity of biomass char, Biotechnology Advances 2009; 27 :568 - 572

Reduction of Heteroatoms in Gas Phase Generated Through Hydrothermal Reaction of L-Cysteine as Biomass Model

M. F. Alif[1], K. Kitagawa[2], K. Matsumoto[2], S. Morita[2]

[1] Dept. of Analytical Chemistry, Faculty of Bio. and Chem. Eng. Nagoya University,

Nagoya 464-8603, Japan. **[2]EcoTopia Science Institute, Nagoya University, Nagoya 464-8603, Japan.**

Email address: matlal_falif@hotmail.com

Abstract. *Because of excessive use of fossil fuels in the 20th century, environmental issues such as global warming and acid rain become increasingly serious. Moreover, fossil fuels are definitely expended in the future. For such environmental cases, biomass resources which are renewable and available in huge amount will be more considerable as an alternative for fossil fuels.*

Supercritical water gasification is a promising technology for the gasification of biomass with high moisture content. When the biomass containing heteroatoms, such as sulfur, nitrogen, etc., are subjected to hydrothermal processes, a numbers of heteroatom compounds are likely to be formed and this can cause damage to the environment.

In this study, the effect on hydrothermal gasification using L-cysteine as biomass model compound was investigated. The hydrothermal reaction was performed in a stainless steel reactor of about 10 cm^3 in volume (10 mm i.d $\times$14.4 mm). 80 mg of L-cysteine was placed into the reactor with 5 cm^3 of water with and without Ca(OH)$_2$ as an additive. To remove the remaining air inside the reactor, N$_2$ gas was purged. The gasification experiments were performed in a GC oven (Hewlett Packcard 5890 Series II) at 400°C with pressure about 26 MPa. This condition was kept for 40 minutes. After the reaction, the reactor was cooled down to room temperature. The gas products were analyzed by gas chromatography with a thermal conductivity detector while the liquid products were subjected to ion chromatography.

The Ca(OH)$_2$ additive led to efficient generation of hydrogen from L-cysteine, increased the hydrogen yield and also reduce the formation of heteroatoms compounds.

Keywords: Heteroatoms, hydrogen, biomass.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Ishida Y., Kumabe K., Hata K., Tanifuji K., Hasegawa T., Kitagawa K., Isu N., Funahashi Y., Asai T.,   (2009)*Biomass and Bioenergy* **33**, 8,.
[2] Yanik J., Ebale S., Kruse A., Saglam M., Yüksel M., (2007) *Fuel*, **86**, 2410–2415
[3] Yanik J., Ebale S., Kruse A., Saglam M., Yüksel M., (2008) International Journal of Hydrogen Energy **33**, 4520–4526

Thermal-hydraulic Safety Analyses of 30 MW MTR Type Research Reactor

Azizul Khakim

Badan Pengawas Tenaga Nuklir (BAPETEN), Jl. Gadjah Mada No.8 Jakarta Indonesia

Email address: zulkh@yahoo.com

Abstract. *Unlike other type of research reactor, such as Triga research reactor, Material Testing Reactor (MTR) which is utilized for irradiating a material with high fluence, operates with high neutron flux. As a consequence MTR type research reactor produces high heat flux that has to be removed with sufficient coolant mass flow rate to ensure no heat accumulation take place in the fuel element. Safety analyses are performed for both normal operation and major design basis accidents (DBA) to ensure that the reactor is maintained secured during its life time.*

In this paper, selected design basis accidents such as Loss Of Flow Accident (LOFA) and Reactivity Insertion Accident (RIA) initiated by inadvertent control rod withdrawal are performed using Program for the Analyses of REactor Transient (PARET) code. For conservative approach, single failure criterion is applied, i.e., assuming that the first trip signal fail to shutdown the reactor and eventually the second one successfully scram the reactor.

Three parameters are to be observed to determine the safety of the reactor undergoing such accidents. In any case, normal or accident condition, the fuel maximum temperature has to be kept below maximum fuel temperature design of 200° C. The fuel cladding has to be maintained below 145° C. In addition, the minimum safety margin against flow instability (S) has to be above 1.48. The parameter S is defined as

$$S = \frac{\eta_C}{\eta_E} \qquad (1)$$

Where η_E is experimental Bubble Detachment Parameter, which is equal to 22.1 cm^{3}K/Ws.

η_C is Bubble Detachment Parameter calculated in the Code by

$$\eta_C(z) = \frac{[T_s(z) - T_c(z)]V(z)}{q''} \qquad (2)$$

q''	*local heat flux (w/cm^2)*
V	*local coolant velocity (cm/s)*
Z	*distance from coolant inlet channel (cm)*
T_s, T_c	*Saturated and coolant bulk temperature (K)*

From the calculations, it has been confirmed that during reactivity insertion accident, the maximum fuel temperature reached 185.3°C which is below the maximum fuel temperature limit of 200°C. As for the cladding temperature, it reached 138.0°C which is also well below its design limit of 145°C. As far as safety margin against flow instability (S) is concerned, it reached the minimum value of 2.25, well above design margin of 1.48. It is therefore, none of the three safety parameters exceed the design limit during reactivity insertion accidents.

In the case of LOFA, the maximum fuel temperature reached 136.4°C. On the other hand, the parameter S reached its minimum value of 3.6. It is therefore concluded that during both RIA and LOFA, none of the safety parameters exceeded their design limit, which implies the reactor can be maintained secured in any case of design basis accidents.

Keywords: Thermal-hydraulic, Safety Analyses, Research Reactor, Material Testing Reactor, Fuel Plate.

Category: *Applied Sciences/Engineering*

Presentation Media: *Oral Presentation*

Books

[1] Woodruff, W.L., (1982), *The PARET code and the analysis of the SPERT I transients,* Argonne National Laboratory*,* RERTR/TM-4.

Journals

[2] E. Ampomah-Amoako, E.H.K. Akaho, A. Anim-Sampong, B.J.B. Nyarko (2009), "Transient analysis of the Ghana Research Reactor-1 using PARET/ANL thermal-hydraulic code" *Journal of Nuclear Engineering and Design,* 239, 2479-2483.

Determination of inorganic anions using short capillary column by ion chromatography with direct UV detection

Anang Sedyohutomo, Hiroshi Suzuki, Chuzo Fujimoto

Department of Chemistry, Hamamatsu University School of Medicine,

1-20-1 Handayama, Higashiku, Hamamatsu, Shizuoka 431-3192, Japan

Email address: anang@hama-med.ac.jp

Abstract. *Ion chromatography is the most usefully technique of liquid chromatography that allowed the separation of ions based on their ionic interaction in separation segment involves stationary phase as well as mobile phase. The separation of ions can be achieved by using column packed ion exchange resin when the system follow ion exchange chromatography technique, and by addition an ion counter reagent into the mobile phase when it is ion pair chromatography system. The latter is more general and applicable approach since allows the separation of complex mixtures of polar and ionic molecules. In case that selectivity of ionic charge in order to determine ionic species depend on ion-pairing reagent supplemented into their mobile phase which subsequently provide the necessary counter ion on stationary phase. Therefore, the hydrophilic ionic solutes of the inorganic anions and cations can be separated by including the large ionic molecule of ion-pairing reagent in a positive charge as well as a negative charge opposite to their analyte.*

It is very common that ion chromatography utilized by electrical conductivity detection for the reason that the analyte has consequently ionize capability such as the ions from inorganic acids, bases and salts. However, among of ionic species of interest can be directly detected at specified wavelengths by ultra violet detection when they are not lack suitable chromophore for UV.

In view of environmentally friendly analysis, the miniaturization of separation columns in liquid chromatography as well as ion chromatography has attracted a great deal of attention. The micro scale of capillary separation column has been rapidly developed especially after invention of fused silica capillaries. Furthermore, the development of fast chromatography technique allowed for shorten retention times by using shorter columns, increasing flow rate and the use of a stationary phase of smaller particle size. Therefore, the development of capillary separation column in order to enhance the efficiency, simplicity and energy saving are still needed.

This research investigated the capability of short capillary column to achieve separation of inorganic anions by ion chromatography using ultraviolet absorption detection for the direct determination of inorganic anions. The separation column was prepared by using short fused-silica capillary tubing packed with L-column2 ODS 5 μm particles by laboratory-made without pre-coating process even it was used for the separation of inorganic anions. The present method allowed the determination of iodate, oxalate, nitrite, bromide and nitrate ions using UV detection wavelength 200 nm. Aqueous solution of cetyltrimethylammonium chloride in sodium sulfate was used as the mobile phase for the separation of five inorganic anions mentioned above within 5 minutes. The effect of cetyltrimethylammonium chloride concentrations in sodium sulfate solution to the retention time behavior and separation condition of each anion was also investigated. Relative standard deviations for the retention time, peak area and peak height were 1.2, 3.4 and 3.6%, respectively. The calibration graphs exhibited linear relationships with the correlation coefficients $R2>0.99$ when 0.1-2.0 mM detection range was evaluated. This system achieved detection limits (S/N=3) of 32-78 μM for these inorganic anions. The present method was successfully applied to the direct determination of nitrate ion in Hydrangea macrophylla leaves as a real sample.

Keywords: Ion chromatography, short capillary column, cethyltrimethylammonium chloride, inorganic anions, direct UV detection.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

Books

[1] James, S. F. and Douglas, T. G. (2009) *Ion chromatography, 4th ed*., WILEY-VCH, Weinheim.

[2] Teresa, C. (2010). "Analytical Chemical Series." *Ion-pair Chromatography and Related Techniques,* Taylor & Francis Group, Boca Raton.

Journals

[3] Richard, J. W. (1983). "Determination of inorganic anions by ion chromatography with ultraviolet absorbance detection." *Anal. Chem.,* 55(6), 851–854.

[4] Damian, C. and Brett, P. (2002). "Fast ion chromatography of common inorganic anions on a short ODS column permanently coated with didodecyldimethylammonium bromide." *J. Chromatogr. A., 953*, 299–303.

[5] Takeuchi, T. and Ishii, D. (1981), "High-performance micro packed flexible columns in liquid chromatography"*J. Chromatogr. A*, 213, 25-32.

Fabrication of 10-nm Block Copolymer Self-Assembled Nanodots for Application to Quantum-Dot Solar Cell

Miftakhul Huda, Takashi Akahane, Takuro Tamura, You Yin, Sumio Hosaka,
Graduate School of Engineering, Gunma University

1-5-1 Tenjin-cho, Kiryu, 376-8515, Japan

Email address: t10801375@gunma-u.ac.jp

Abstract. *In this study, we investigate self-assembled large-area nanodot fabrication on a silicon substrate using poly(styrene)-poly(dimethyl-siloxane) (PS-PDMS) for the application to quantum dot solar cell. We demonstrated fabrication of much finer self-assembled nanodots with a diameter of 10 nm to enhance quantum-dot effect using PS-PDMS block copolymers with molecular weights of 11,700-2,900 for the application to quantum-dot solar cell. We changed spin-coating speed between 4000 rpm and 8000 rpm to obtain a proper PS-PDMS film thickness for forming one-layer nanodot arrays in large area.*

Self-assembly to form nano-pattern by block copolymer has attracted much attention due to its potentials of nanolithography with the ease of large-area fabrication, and low cost. Recently, Ion Bita et al. succeeded in forming block copolymer self-assembled nanodots with a diameter of 20 nm and a pitch size of 40 nm using PS-PDMS (Poly(styrene-b-dimethyl-siloxane)) block copolymer and demonstrated the fabrication of long-range-order nanodot arrays by using electron-beam drawing template[1-2]. This technique allows to form nanodot array in large area at low cost. This implies its potential application to high-efficiency quantum-dot solar cell as next-generation solar cell, in which a large-area nanodot array is necessary. In our study, we report formation of much finer self-assembled nanodots with a diameter of 10 nm to enhance quantum-dot effect using PS-PDMS block copolymers with fewer molecular weights for the application to quantum-dot solar cell.

In this work, we adopted spherical morphology PS-PDMS with molecular weight of 11,700-2,900. Figure 1 schematically shows the process of our self-assembled nanodots experiment. We changed spin-coating speed between 4000 rpm and 8000 rpm to obtain a proper PS-PDMS film thickness for forming one-layer nanodot arrays in large area.

Fig. 1 Experimental processes for formation of self-assembled nanodot array.

Figure 2 shows SEM images of PS-PDMS self-assembled nanodots using PS-PDMS with the molecular weight of 11,700-2,900. Figure 2 (a) is the SEM image of self-assembled nanodots with magnification of 300,000 times. Figure 2 (a) shows that we have succeeded in fabricating self-assembled nanodots with a diameter as small as 10 nm and a pitch size as small as 20 nm although the orientation cannot be well controlled. Figure 2 (b) is SEM image of self-assembled nanodots with magnification of 100,000 times. It can be obviously observed that 10-nm-diameter and 20-nm-pitch nandots can be formed in a large area on the substrate. And our randomly selected observations in an even larger area show the similar results. This means that we successfully formed 10-nm-diameter and 20-nm-pitch nandots in large area.

In summary, we demonstrated the formation of 10-nm-diameter and 20-nm-pitch self-assembled nanodots in large area by using PS-PDMS block copolymer with the molecular weight of 11,700-2,900. In the production of the third generation quantum dot solar cell, this technique gives great promise because of its low fabrication cost, large-area fabrication, and no strict requirement on highly periodic pattern.

Keywords: nano-patterning, self-assembly, block copolymer, nanodot, quantum dot solar cell

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1]Ion Bita et al., Science 321, 939(2008)

[2]C. A. Ross et al., J. Vac. Sci. Technol. B Vol. 26, 2489(2008)
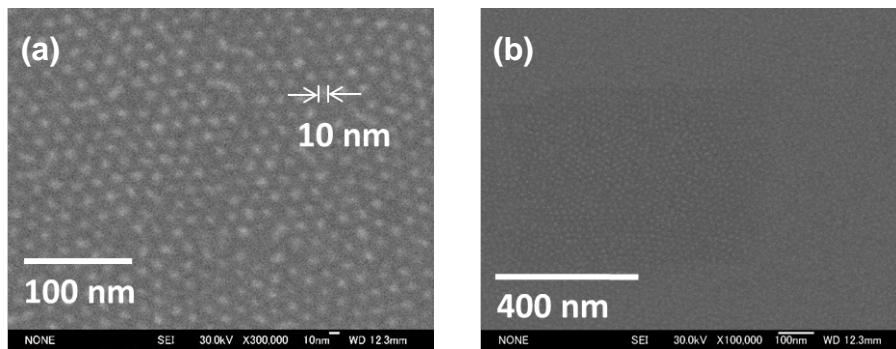
Fig. 2 SEM images of block copolymer self-assembled nanodots using PS-PDMS with the molecular weight of 11,700-2,900. (a) magnification of 300,000 times (b) magnification of 100,000 times

Energy Consideration on Coverage Control with Dynamic and Limited Range Anisotropic Sensor for Mobile Sensor Networks

Risvan Dirza

Fujita Laboratory, Department of Mechanical and Control Engineering,

Tokyo Institute of Technology

Email address: ris_frans87@yahoo.com

Abstract. _Introduction: Mobile sensor networks hold a promise to be the next network generations with small low power mobile devices that operate in a distributed manner. This technology is stimulated by the development of relatively cheap communication, computation, and sensing devices. Applications that can be realized using this technology are environtmental monitoring, surveillance, safety, searching, and many more. Deploying mobile sensor is advantageous compared to static sensor network and single agent case._

There are various objective that many researchers focus on, one of them is coverage problem with mobile sensor networks. Many of them often consider agent as omni-directional model. However, many common and cheap devices do not meet this specification in practice (e.g. camera, radar). Therefore, it is considered a limited range anisotropic sensor models.

Motion coordination algorithms should also include power consideration to reduce the probability of single agent due to lack of power. Therefore, we consider a current power state in the model and present power-aware coverage algorithm "to drive the mobile sensors to the region of interest". This algorithm also dynamically controls the sensing range of an agent depends on its power state.

Problem Formulation: We define a given region as Q. Furthermore, a density function $\phi(q): Q \to \Re_+$ defines the level of interest in Q. Let $P = (p_1, \dots p_n)$ be the position of the N agents and $\theta = (\theta_1, \dots \theta_n)$ be the orientation. It is assumed that each agent has an "energy content" E_i and omni-directional communication capability.. Every motions $(\dot{p}_i(t), \dot{\theta}_i(t))$ of an agent consume energy E_i. Every agent in the given region has limited sensory domain Q_i (range and direction). The sensing ability declines along the radial distance and angle (anisotropic). This sensory domain will be dynamically change depends on embodied energy E_i. Moreover, a distributed control algorithm is considered here, so that each agent can only obtain information if the events are located inside its neighbor.

The Methods: First, the joint probability P is needed to determine whether an event is occuring at a point or not by any of the agents within neighbor. Then, we can analyze the optimal coverage problem of agents by maximizing the objective function $F(p, \theta, E) = \int_Q \phi(q) P(q, p, \theta, E) dq$. There is a kinematic model : $p_i(t+1) = p_i(t) + u_i(t)$ and $\theta_i(t+1) = \theta_i(t) + v_i(t)$. $u_i(t)$ and $v_i(t)$ are the control inputs for position and orientation respectively. Note that the motion is fully controlled by them.

We proposed a new control input corporating to power-aware coverage metric algorithm :

$u_i(t) = \left(2k_e A(Q_i) \frac{E_i^{m+z}}{E_{max}^4}\right)^{-1} \frac{\partial F}{\partial p_i(t)}$ and $v_i(t) = \left(2k_e A(Q_i) \frac{E_i^{m+z}}{E_{max}^4}\right)^{-1} \frac{\partial F}{\partial \theta_i(t)}$. _This algorithms only need local information: position, orientation, current energy, level of interest and sensory domain. These control laws have been proved as gradient descent algorithm for F by computing the gradient and Lie Derivative. In_

addition, we also incorporate communication cost by making trade off with coverage.

$$J(p,q,E) = w_1 F(p,q,E) - w_2 w_c \sum_{i=1}^{N} r_i(t) c_i(t,\varsigma).$$

Results and Significances: The proposed power-aware coverage metric algorithm can drive the agents to the region of interest and saves more energy consumption (60%-in simulations) in dynamically sensing range. The agent move and rotate until they reach their optimal configuration. In case of corporating communication cost, we can reduce the communication cost by utilizing the same proposed algorithm and adding algorithms related to communication relationship among agents.
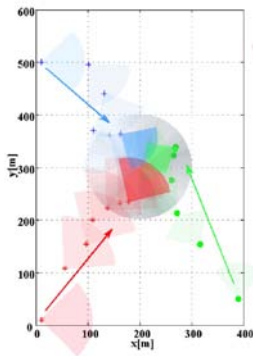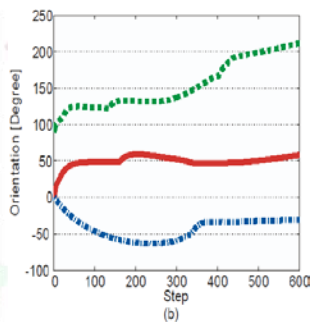
Fig.1 Trajectories   Fig.2 The Orientation   Fig.3 Objective Function   Fig.4 Comparison of Energy
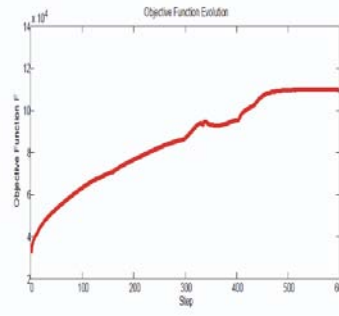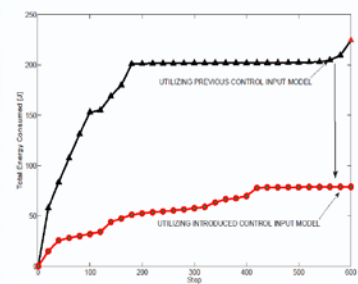
Conclusion:
1. A distributed power-aware coverage control scheme for mobile network has been developed
2. The proposed algorithm and control laws may work for finite energy and dynamically change limited-range anisotropic sensors. It reduces energy consumption.
3. We incorporate communication cost and add some algorithm related to communication relationship for data transfer in the model.

Keywords: Mobile Sensor Networks, Power-Aware Coverage, Distributed Control Algorithm, Communication Cost

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] S. Martinez, F. Bullo, J. Cortes, "Motion coordination with distributed information," *IEEE Control Systems Magazine*, Vol. 27, No.4, pp. 75-88, 2007.

[2] Reza Olfati-Saber, J. Alex Fax, and Richard M. Murray, "Consensus and Cooperation in Networked Multi-Agent Systems*," Proc. of the IEEE*, Vol. 95, No.1, pp. 215-233, 2007.

[3] A. Gusrialdi, T. Hatanaka, and M. Fujita, "Coverage Control for Mobile Networks with Limited-Range Anisotropic Sensors," *Proc. of the 47th IEEE Conference on Decision and Control*, pp. 4263-4268, 2008.

[4] A. Kwok, and S. Martinez, "Energy-balancing cooperative strategies for sensor deployment," *Proc. of the 47th IEEE Conference on Decision and Control,* pp. 6136-6141, 2007.

[5] W. Li, and C.G. Cassandras, "Distributed Cooperative Coverage Control of Sensor Networks," *IEEE Conference on Decision and Control*, pp. 2542-2547, 2005.

Tracking a Fixed and Changed Periodic Trajectory of Robot Manipulators using Adaptive Dominant Type Hybrid Adaptive and Learning Controller

Munadi[1], Tomohide Naniwa[2]

[1] **System Design Engineering, Graduate School of Engineering, University of Fukui, Japan**
[2] **Department of Human and Artificial Intelligent System, University of Fukui, 3-9-1 Bunkyo, Fukui, 910-8507, Japan**

munadi@rbt.his.u-fukui.ac.jp

Abstract. *This paper presents an adaptive dominant type hybrid adaptive and learning control which is resulted by combining the model-based adaptive control (MBAC) and the repetitive learning control (RLC) to consider a fixed and/or changed periodic trajectory tracking of robot manipulators. This paper is motivated by the automation processes requirement which needs a high-speed accurate trajectory tracking performance, such as welding and grinding process. Although we can apply the classical proportional-derivative (PD) controller in various control systems including robot manipulators, but the performance obtained from this controller is not satisfactory for the task which requires high accurate trajectory tracking performance.*

We propose a hybrid adaptive and learning controller to obtain their perspective benefits for increasing controller performance. In this hybrid controller, we classify into two groups as the learning dominant and the adaptive dominant controller. The learning dominant controller means that the learning input is greater than the adaptive input when the hybrid controller input achieves the actual position trajectory converging to the desired trajectory. The main advantage of the learning dominant controller method is that the RLC will manage and update control input accurately for the fixed periodic desired trajectory. The problem appears when the periodic desired trajectory is changed which the controller needs much time to relearn the feed-forward control input. To overcome this weakness, several researchers have been developed a new method called adaptive dominant controller, but for covering the stability analysis, almost of their controller methods used two estimation vectors of the unknown dynamical parameters. Unfortunately, it consumes a lot of CPU time and memories for calculating a control input, and also this controller implementation is more complex.

Therefore, we propose an adaptive dominant in the hybrid adaptive and learning controller that allows us to use only one estimator vector of the unknown dynamical parameters, in which the adaptive control law is compensated by the residual regressor matrix, whereas the repetitive learning law is obtained based on the original repetitive learning law without the estimation adaptive term element. In the learning law, we add a forgetting factor to make the learning input approaching to zero for next period of the trajectory by setting a forgetting factor less than one. This proposed controller has a simpler implementation structure than over the hybrid adaptive and learning controllers. Also, the proposed controller can absolutely adjust the feed-forward control input immediately, so it does not spend more time to relearn the feed-forward control input when trajectory is changed. We can prove the stability of this controller based on the Lyapunov method. By this method, the controller gains on the stability analysis are established and the new controller guarantees the tracking position converging to zero.

In order to show the effectiveness of the proposed controller, we conduct a computer simulation study that is carried out using a two-link planar robot manipulator with revolute joints. The simulation is performed using three periodic desired trajectories in the joint coordinates to show a fixed periodic desired trajectory in the first joint and a changed periodic desired trajectory in the second joint. Based on the simulation results, the proposed controller proves that asymptotic convergence to zero tracking position error is able to be achieved as time approaches infinity. This shows that the new controller guarantees a significant tracking performance to achieve the desired trajectory accurately. In future work, this research will be directed to the experimental verification of the proposed controller by using a real robot manipulator.

Keywords: adaptive controller, learning controller, robot manipulators.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References
Books

[1] Lewis, F. L., Abdallah, C. T., Dawson, D. M. (1993). "Control of robot manipulators : Theory and Practice." Macmillan, New York.

Journals

[2] Arimoto, S. (1990). "Learning control theory for robotic motion." *Int. J. of Adaptive Control and Signal Processing.* Vol. 4, pp. 543-564.

[3] Nakada, S., Naniwa, T. (2007). "An adaptive learning controller for robot manipulators in which adaptation rule dominant." *Proceedings of 2007 CACS International Automatic Control Conference*, Taiwan, D112.

[4] Munadi, Naniwa, T. (2010). "An adaptive controller dominant type hybrid adaptive and learning controller for trajectory tracking of robot manipulators." *Proceedings of 2010 International Symposium on Flexible Automation.*

[5] Sun, M., Ge, S.S., Mareels, I.M.Y. (2006). "Adaptive repetitive learning control of robotic manipulators without the requirement for initial repositioning." *IEEE Transactions on Robotics.* Vol. 22, pp. 563-568.

Laser-Induced Plasma Spectroscopy Using TEA CO$_2$ Laser and Its Applications to Rapid Elemental Analysis

Ali Khumaeni[1], Zener Sukra Lie[1], Hideaki Niki[1], and Kiichiro Kagawa[2]

[1]Program of Nuclear Power and Energy Safety Engineering,

University of Fukui, Japan

[2]Research Institute of Nuclear Engineering,

University of Fukui, Japan

Email address: khumaeni@gmail.com, kagawa@f-edu.u-fukui.ac.jp

Abstract. *The analysis of elements on material target including solids, metals, liquids and gases has become a subject of great interest. This is because the emission spectrum of elements can be used to know the characteristics of material samples. Many analytical methods have been developed to investigate the elements in the samples. Among them are inductively coupled Plasma Atomic Emission Spectrometry (ICP-AES), Inductively Coupled Plasma Mass Spectrometry (ICP-MS), and Mass Atomic Emission Spectrometry (M-AES). Those methods perform high precision and sensitivity in elemental analysis. However, in those methods, the samples must first be liquid often being prepared by either wet digestion or dry ashing. Thus, the analysis requires delicate sample preparation, labor intensive and expensive equipments.*

Recently, the most promising method for qualitative and quantitative analysis on material is Laser-Induced plasma Spectroscopy (LIPS), which is now commonly referred to as Laser-Induced Breakdown Spectroscopy (LIBS). This method enables one to carry out rapid and direct analysis without significant time consumption. In standard LIBS technique, a pulsed laser with high peak power and short pulse duration such as Nd: YAG laser is mostly employed to induce laser plasma at atmospheric pressure. However, due to the short pulse duration (8 ns) and high power density (about 10^{10}-10^{11} W/cm^2) of the Nd: YAG laser, the standard LIBS technique using Nd: YAG laser cannot be applied to perform direct elemental analysis on sample present in the form of soft and powder samples such as food powder, and soil sample. Therefore, in this technique, the analysis is mostly made after pressing the samples into a pellet.

On the other hand, we have found that a transversely excited atmospheric (TEA) CO$_2$ laser has many advantages as the energy source of the LIBS[1-3]. First, effective application of the TEA CO$_2$ laser to the LIBS was made on carbon analysis for inspecting carbonation of concrete, which occurred by a chemical reaction of Ca(OH)$_2$ with CO$_2$ gas in environmental air inducing the degradation of the quality of building. It was proved that the TEA CO$_2$ laser is much superior to the Nd: YAG laser to detect C in concrete. Second, by using the metal-assisted subtarget effect in a TEA CO$_2$ laser-induced low pressure plasma, a film analysis can successfully be conducted. Third, we have noticed that a strong gas plasma, which is induced when a TEA CO$_2$ laser (300 -1500 mJ, 200 ns) was focused on a metal surface in atmospheric pressure without leaving the metal surface damaged, can effectively be used for elemental analysis because the high temperature gas plasma with high heat capacity continues for rather long time of the order of several tens microsecond. Thus, we can apply this gas plasma for dissociation and excitation of the powder samples. We have developed various types of modification in sampling technique of powder samples and liquid samples as well as gas samples in order to send the samples into the gas plasma. Also, effective application of the TEA CO$_2$ laser to the LIBS was made on wood sample for inspecting hazardous elements such as chrome, copper, and arsen (CCA), which is usually used for preservative material in wood. For analysis of hard samples, such as metals and alloys, we can use a double pulse technique in surrounding He gas at atmospheric pressure. Namely, the TEA CO$_2$ laser is employed to produce a lot of meta-stable He atoms in the laser-induced He gas plasma by focusing the laser on the metal sample, while the Nd-YAG laser, which is synchronized with the TEA CO$_2$ laser, is irradiated on the metal surface to ablate the atoms from the metal sample. The ablated atoms move into the He gas plasma region to be excited through meta-stable He atoms.

This method has a high prospect to realize a highly sensitive analysis because the atoms are excited in a cooled plasma, resulting in very low spectral background.

In this study, we will discuss in detail the TEA CO_2 laser-induced plasma and its applications to elemental analysis on many kinds of powder samples such as soil samples, pharmaceutical product samples, food powder samples, powdered rice samples, coal and mining samples, commercial powder samples, and chemical powder product, wood samples, metal samples, liquid samples, and gas samples. This present technique has high possibility to be applied in production factories in Indonesia.

Keywords: Laser-induced plasma spectroscopy; LIPS; TEA CO_2 laser

Category: *Applied sciences/engineering*

Presentation Media: Oral presentation

Selected References

[1] Khumaeni, A., Ramli, M., Deguchi, Y., Lee, Y. I., Idris, N., Kurniawan, K. H., Lie, T. J., and Kagawa, K. (2008). "New technique for the direct analysis of food powders confined in a small hole using transversely excited atmospheric CO_2 laser-induced gas plasma." *Appl. Spectrosc.,* 62(12), 1344-1348.

[2] Khumaeni, A., Niki, H., Deguchi, Y., Kurihara, K., Kagawa, K., and Lee, Y. I. (2009). "Analysis of organic powder samples by using the metal-assisted subtarget effect in a transversely-excited atmospheric (TEA) CO_2 laser-induced He gas plasma at 1 atm." *J. Korean Physic. Soc.,* 55(6), 2441-2446.

[3] Khumaeni, A., Lie, Z. S., Niki, H., Fukumoto, K., Maruyama, T., and Kagawa, K. (2010). "A novel double-pulse laser plasma spectroscopic technique for H analysis in metal samples utilizing transversely excited atmospheric-pressure CO_2 laser-induced metastable He atoms." *Optic. Review.,* 17(3), 285-289.

Hydrothermal Treatment Technology to Produce Chlorine-Free Solid Fuel from Municipal Solid Waste

Bayu Indrawan S, Pandji Prawisudha and Kunio Yoshikawa

Tokyo Institute of Technology, Dept. of Environmental Science and Technology

me@bayu.in

Abstract. *Municipal Solid Waste (MSW) has been a big problem for environment in every country in the world, especially in Indonesia. Many people are curious about how to manage and overcome the world's waste produced daily by human. But nowadays, as the technology advanced and improved, the view on waste is also consequently changed. Waste can benefits people and considered as an important economical values due to its capability to be recycled as fuel or fertilizer [1]. It also could be considered as alternative solution for solving the problem of limited energy supply. This social awareness provides a big opportunity for solid fuel production from MSW by hydrothermal treatment system.*

The hydrothermal treatment is a technology to produce dried uniform pulverized coal-like solid fuel or organic fertilizer by converting unutilized bio-resources such as food residue, sewage sludge, animal manure, agricultural residue, high moisture content solid wastes and MSW using low energy consumption [2][3]. The demonstration plant mainly consists of a reactor, a boiler, and auxiliary equipment such as a steam condenser and water treatment. The process begins by loading raw MSW in the reactor and injecting saturated steam about 200°C and 2MPa into the reactor. The next process is mixing and obtaining the homogenous waste reactions with steam which is conducted by using the blades rotated by the rotor unit in the reactor. And then the process condition is held for specific period which is called as the holding time when the temperature and pressure inside the reactor reaches certain values. After finishing the reaction and discharging steam, wet uniform crashed material can be extracted from the reactor, and it shows significantly improved drying performance to become powdery dried products.

The proposed system, however, comes with limitation. Unfortunately, impregnated plastic in MSW contains chlorine originated from polyvinylchloride (PVC). Since chlorine is known to promote clogging, corrosion and dioxin formation in solid fuel furnaces, an additional chlorine removal process is inevitable [4]. However, previous research [5] showed that after the hydrothermal treatment, the organic chlorine in the sample was reduced and converted into inorganic chlorine by dehydrochlorination effect and the reaction with the alkaline content in MSW, so finally inorganic chlorine in the product can easily removed only by washing process.

The experiments were performed to produce chlorine-free solid fuel from MSW by the hydrothermal treatment combined with water-washing process, and the parameters which could influence to obtain the product with less than 3,000ppm inorganic chlorine content were finally identified. The results indicated that one-time washing could remove up to 96% of inorganic chlorine, and the 1:1 water to product ratio was sufficient to produce less than 3,000ppm inorganic chlorine content in the product if the washed water would be reused for the next washing process.

Keywords: municipal solid waste, solid fuel production, hydrothermal treatment, chlorine removal, washing process

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] United Nations Environmental Programme, Division of Technology, Industry and Economics, International Environmental Technology Centre, "Converting Waste Agricultural Biomass into a Resource", 2009.

[2] K. Sato, Z. Jian, J.H. Soon, T. Namioka, K. Yoshikawa, Y. Morohashi, J. Takase, M. Nozaki and T. Kaneko, "Studies on Fuel Conversion of High Moisture Content Biomass Using Middle Pressure Steam", Proceeding of Thermal Engineering Conference, 2004, pp. 255-260.

[3] G. Jambaldorj, M. Takahashi and K. Yoshikawa, "Liquid Fertilizer Production from Sewage Sludge by Hydrothermal Treatment", Proceedings of International Symposium on EcoTopia Science, 2007.

[4] K. Yoshikawa, "Hydrothermal Treatment of Municipal Solid Waste to Produce Solid Fuel", 7th International Energy Conversion Engineering Conference, 2009.

[5] P. Prawisudha, K. Yoshikawa, H. Takano and Y. Ishida, "Solid Fuel Production from MSW using Innovative Hydrothermal Treatment Technology for Cement Kiln Application", 2009.

Dechlorination of Plastic Waste in Lower Temperature by Employing Hydrothermal Process

Pandji Prawisudha[1], Kunio Yoshikawa

[1] Tokyo Institute of Technology, Dept. of Environmental Science and Technology,

G5-8, 4259 Nagatsuta, Midori-ku, Yokohama 226-8502, JAPAN

Email address: pandji.p.aa@m.titech.ac.jp

Abstract. *Conventional solid fuel users are and will be facing increasing fuel price due to increased consumption and limited resource. On the other hand, unused resources such as household waste is now creating health and social problems due to limited dumping area and high processing cost. These conditions resulted in the idea of waste usage as alternative solid fuel.*

Unfortunately, the usage of waste derived fuel in high temperature solid fuel combustor is hindered by many technical factors, not just by its high moisture content and low energy density, but also its chlorine content, especially in plastic impregnated waste which contains organic chlorines. The organic chlorine in high combustion temperature, without further treatment, will be released to the atmosphere as dioxin, and will promote the corrosion and clogging in exhaust gas line.

A medium pressure hydrothermal process is proposed to produce an alternative solid fuel from waste. A large scale system of about 1 ton capacity, applying middle pressure saturated steam at about 2 MPa for about 60 minutes holding time was used to treat the waste. First stage of the experiment was using Municipal Solid Waste (MSW) and it was shown that the yielded slump product has better uniformity, higher density and similar heating value to that of MSW. The product also shown better natural drying performance and the final form of dry product was similar to that of pulverized coal, suitable for retrofitting or co-firing in current solid fuel combustors.

From the MSW experiment employing hydrothermal process, it was shown that the amount of residual organic chlorine in MSW was decreased, while no drastic increase in HCl content nor decrease in pH were observed. This phenomenon suggested that in the case of MSW hydrothermal process, the organic chlorine was converted into inorganic chlorine in lower temperature by certain material inside MSW. The inorganic chlorine can then be water washed to produce a chlorine-free product.

Ash analysis of MSW and hydrothermal product showed that certain amount of alkali and alkaline metals were occurred, suggesting their role as the catalyst of dechlorination and chlorine conversion in lower temperature compared to conventional dehydrochlorination process. Subsequent hydrothermal experiments using simulated plastic waste in the same large scale system has shown that the organic chlorine in MSW was converted to inorganic chlorine assisted by additional calcium hydroxide (Ca(OH)$_2$), while without the additional Ca(OH)$_2$, only dehydrochlorination occurred in effect of hydrothermal process. It can be concluded that the combination of hydrothermal process with additional alkalis and water washing process is able to produce a chlorine-free, pulverized-coal-like alternative solid fuel from plastic impregnated MSW.

Keywords: plastic waste treatment, hydrothermal process, alternative solid fuel, chlorine removal

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

Books

[1] Perry, Robert H. and Green, Don W. (1997) "Chapter 2: Physical and Chemical Data." *Perry's Chemical Engineer's Handbook, 7th ed.*, McGraw-Hill, New York, 2-120.

Journals

[2] Endo, K.; Emori, N. Dechlorination of Poly(vinyl chloride) without Anomalous Units Under High Pressure and at High Temperature in Water, Polym. Degradation and Stability 74, 2001, 113-117.

[3] Takeshita, Y.; Kato, K.; Takahashi, K.; Sato, Y.; Nishi, S. Basic Study on Treatment of Waste Polyvinyl Chloride Plastics by Hydrothermal Decomposition in Subcritical and Supercritical Regions, J. of Supercritical Fluids 31, 2004, 185-193.

[4] Matheson, L. J. and Tratnyek, P. G. Reductive Dehalogenation of Chlorinated Methanes by Iron Metal, Environ. Sci. Technology 28, 1994, 2045-2053.

Internet Sources

[5] "Japan Vows Big Climate Change Cut", http://news.bbc.co.uk/2/hi/8241016.stm

Impulse injection voltage effects on a single ground rod electrode

Yul Martin

[1] Departement of Electrical Engineering,FT-UNILA

Jl. Prof.Dr.Soemantri Brojonegoro No.1, Bandar Lampung

D-2, School of Informatic and Electrical Engineering, Kyushu University

Email address: yul_martin@unila.ac.id

Abstract. *Impedance grounding is not only influenced by a small resistance value or resistance of pure (R) is measured using DC voltage or low frequency components but also influenced by the inductance (L) and capacitance (C). Due to the existence of elements of L and C, then the grounding impedance value is influenced by the frequency. Greatly affect the low frequency high impedance earthing, suppose that at high frequency (order of kHz) caused by lightning strikes. This study aims to determine and compare the value of grounding impedance at low frequencies and high frequencies on the model of rod electrode. It was found the result obtained by average percentage between grounding resistance measure by DC voltage and grounding resistance measure by impedance (8%). This study also discusses grounding electrode model that considered component of resistive,inductive,and capacitive. From this model we calculate variation of dept of rod grounding electrode for 2m to 6m based on impulse response. It results obtained by measuring and calculate that the lowest impedance grounding at 23.1 Ω in a dept 6m with each average of decrease 1,2, and 6 m at 5.25 Ω.*

Keywords: Impulse response, grounding impedance,grounding resistance.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Ilahi A, Y.Martin (2005), *Studi system pembumian batang tunggal dengan menganalisis resistansi jenis tanah (system driven rod), Universitas Lampung, Bandar Lampung.*

[2] Pakpahan P (2002), *Impedansi konduktor pengetanahan pada kajian tegangan lebih akibat petir.SNWTT V.Yogyakarta.*

[3] Yaqing Liu (2004), Response of transient of grounding systems caused by lightning: modelling and experiments. Acta Universitatis upsaliensis. uppsala.

[4] A.Arismunandar .(1984) *Teknik Tegangan Tinggi*, Prad Paramita*, Jakarta*

[5] TS.Hutauruk.(1991) *Pentanahan Sistem Tenaga dan Peralatan*, Erlangga, Jakarta.

Size controlled synthesis and separation of gold nano colloids by hydrodynamic chromatography

Siswoyo, Lee Wah Lim, Takeuchi Toyohide

Department of Material Engineering, Graduate School of Engineering, Gifu University.

Email address: siswoyojp@yahoo.co.jp

Abstract.

There has been significant awareness in gold nanoparticles over the past few decades especially recent several years, because of their exclusive shape, size and aggregation dependent optical properties.

Generally, gold colloids are synthesized from a gold precursor with appropriate reducing agents. The shape and size of gold nanoparticles depend on a variety of process variables such as reactant concentration, temperature, surfactants, etc. In this study, gold nano colloids were synthesized via the reduction of tetrachloroauric acid ($HAuCl_4$) considering their size control. The prepared gold colloids were evaluated by dynamic light scattering, TEM and hydrodynamic chromatography (HDC). In this study, monolithic silica capillary columns were employed for HDC because of their potential for high efficiency.

The solutions of gold nano colloids initially develop a grey color which changes to a red color. The color of gold nano colloids is due to their surface plasmon resonance. The surface plasmon resonance property depends both on the size and the shape of gold nanoparticles. With increasing amount of $HAuCl_4$ added in the synthesis, the maximum absorption wavelength of the gold colloid increased, e.g., 523 to 550 nm. The mean particles diameter also increases from 13 to 61 nm. Gold colloids with particles sizes of 13, 17, 33, 43 and 61 nm were used as the analytes. Aqueous solution of 8 mM of sodium dodecyl sulfate was used as the eluent and the flow rate was kept at 1 µL/min, and an injection volume of 20 nL. Monolithic silica capillary columns with 0.1 mm I.D. were used for the separation of these nano colloids. Preliminary results showed the tendency of different elution time for different size of colloids. When a 300×0.1 mm I.D. monolithic column was used, the elution times for 61, 43, 17, and 13 nm silica colloids were 2.51, 2.64, 2.72 and 2.85 min, respectively. From this preliminary result we expect that monolithic columns could be a good alternative for separation of gold nano colloids in HDC.

Keywords: Size control, Gold nano colloids, Hydrodynamic chromatography

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

Journals

[1] A. Doron, E. Katz, I. Willner, (1995). Langmuir, 11, 1313.

[2] T. Takeuchi, Siswoyo, Z. Aspanut, L.W. Lim, (2009). Analytical Sciences, 25, 301-306.

Soft-Mode Turbulence in Electroconvection of Nematic Liquid Crystals

Rinto Anugraha[1], Tatsuhiro Ueki[1], Fahrudin Nugroho[1], Yoshiki Hidaka[1], Shoichi Kai[1,2]

[1] Dept. of Applied Quantum Physics and Nuclear Engineering, Graduate School of Engineering, Kyushu University, Fukuoka, JAPAN.

[2] Dept. of System Life Science, Graduate School of System Life Science, Kyushu University, Fukuoka, JAPAN.

Email address: rinto@athena.ap.kyushu-u.ac.jp

Abstract. *Turbulence is a common phenomenon and observed in many physical systems, for example in fluid systems. Turbulence occurs when a strong external field is applied to the system. Several tools can be used to study behaviors of turbulence such as statistical as well as nonlinear physics. Here, there is a disadvantage in order to understand it, namely strong linearity in turbulence. There are several classes of turbulence such as spatiotemporal chaos (STC) and fully developed turbulence, which are distinguished by length scale. For the STC, the correlation length is much larger than the length scale of energy injection, whereas the opposite comparison applies for the fully developed.*

Here, we are working on soft-mode turbulence (SMT) which is a new type of STC induced by nonlinear interaction between the long-wave length Nambu-Goldstone modes and the short-wave length convective modes [1]. The SMT is observed in electroconvection of homeotropic nematic liquid crystals.

We are researching the SMT with a motivation that the statistical details of the SMT are not well understood yet. On the other hand, we found several curious phenomena observed in the SMT such as order-disorder phase transition and defects. Here, our purpose is to investigate some statistical properties of the SMT.

The nematic liquid crystal MBBA is aligned perpendicularly to the sample cell. The sample cell is maintained at a constant temperature 30 C. An alternating voltage V with ac frequency f is applied to the sample cell. Initially, the nematic director n has a continuous rotational symmetry. When V is applied below a first threshold V_F, the symmetry is still kept. Later, when $V > V_F$, n bends with respect to the initial axis, and C(r)-director, a projection of n in x-y plane occurs. Since C(r)-director can freely rotate, this induces the Nambu-Goldstone modes. Moreover, when V is applied beyond V_c, electroconvection occurs which is indicated by the appearance of convective roll pattern labeled by wavevector $q(r)$. Here, soft-mode turbulence occurs from the nonlinear coupling between C(r) and q(r).

Actually, there are two types of rolls in the SMT, namely oblique rolls (OR) and normal rolls (NR) which is below and beyond the so-called Lifshitz frequency f_L. For OR, C(r) and $q(r)$ are not parallel each other, whereas for NR they are parallel. To distinguish the difference between two rolls, we introduced an order parameter called pattern ordering Mp which measures the degree of the order of the convective pattern [2]. We found that Mp is zero for OR and finite for NR. This means, there exists a transition from the disordered pattern (OR) to the ordered one (NR). We also found that the transition point equals to f_L.

Another new interesting phenomenon in the SMT is the occurrence of line defect called blackline. We revealed that the blackline behaves as a line defect of C(r)-director and includes sequence of

point defects [3]. Since the blackline occurs only in the OR regime, the occurrence of this defect is due to the symmetry in the SMT.

Keywords: turbulence, patiotemporal chaos, nematic liquid crystals, electroconvection, soft-mode turbulence, order-disorder transition, line defect.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Kai, S., Hayashi K., and Hidaka, Y. (1996). "Pattern Forming Instability in Homeotropically Aligned Liquid Crystals." *J. Phys. Chem.* 100, 19007-19016.

[2] Anugraha, R., Tamura, K., Hidaka, Y., Oikawa, N., and Kai, S. (2008). "Order-Disorder Phase Transition in a Chaotic System." Phys. Rev. Lett. 100, 164503-1-4.

[3] Anugraha, R, Hidaka, Y., Ueki, T., and Kai, S. (2009 "Symmetry-Dependent Defect Structure in Soft-Mode Turbulence." Phys. Rev. E 80, 041701-1-4.

Core Fuel Management Analysis on Breeding Capability of Water-Cooled Thorium Reactors

Sidik Permana[1,21], Abdul Waris[2], Azizul Khakim[1], Deby Mardiansyah[3]

[1] Tokyo Institute of Technology, [2] Bandung Institute of Technology, [3] Tokai University

psidik@gmail.com

Abstract. *Breeding capability generally attributed to the conversion capability of new fissile production from fertile material which can meet equal or more than required supply fissile fuel (fresh fuel). The proven technology especially water cooled reactor, which is mainly light water and heavy water reactor, produces the energy by consuming uranium fuel with lower conversion ratio capability. Some evaluations show the performances of breeding and void reactivity of water-cooled thorium reactor which also give some feasible area of breeding and negative void reactivity to estimate the feasible design region of the reactors [1-5]. The results have confirmed that fissile of ^{233}U gives better breeding capability and contribute more to the negative void coefficient as the main fissile material.*

The objective of this study is to evaluate the reactor core performances and fuel management by using core burnup of SRAC COREBN calculations which adopted 2-dimensional hexagonal model as the core fuel configuration. The evaluations are based on the heavy water cooled thorium reactors. This Calculation was employed to analyze the core configuration system based on the optimum result of equilibrium cycle iterative calculation systems (ECICS) [3]. The COREBN is a code for multi-dimensional core burnup calculation based on macroscopic cross-section interpolation and finite difference diffusion. The cell burnup calculation produce the macroscopic cross-section as preparing it as macroscopic cross-section table for every type of fuel assembly before it uses as the data input for COREBN calculation.

We evaluated two different refueling modes for investigating the core design performance. The out in refueling and in-out refueling methods are adopted for this refueling scheme using three batches core configuration systems. In-out refueling mode means the inner ring of core (Core 1 region) or the most irradiated fuel shifts to outer ring (to Core 2 region) and the Core 2 (middle core) shifts to outer core (Core 3) and the Core 3 is taken out from the reactor. The Core 1 or the most inner core will be loaded by fresh fuel.. For second cycle, the same mode is employed until sufficient cycle. The Out-In refueling mode is the reversed mode of In-out refueling mode. The outer ring or core shifts to the inner ring and the most inner ring (Core 1) is taken out form the reactor. The most outer core (Core 3) is loaded by the fresh fuel.

To confirm the results, the core burnup calculation has been made based on one of the optimum design criteria. Some design configuration criteria have been used to estimate the feasible design region of breeding and negative void reactivity coefficient. Obtained result of core burnup evaluation has confirmed the feasibility of heavy water cooled thorium breeder reactor with negative void reactivity. The conversion ratio trend obtains almost the same profile with k-eff profile. More than 20 months of refueling period are employed for these evaluations of three batches refueling scheme. This system shows the breeding condition at the end of cycle for average core burnup of more than 33 GWd/t and it always gives negative void reactivity coefficient during reactor operation. Preliminary results of thermal hydraulic properties show the reactors have large margins due to the limitation of thermal hydraulic design point of view and some comparable result with the conventional reactor.

Keywords: Core Management, Breeding, water-cooled, Thorium

---

[1] Recently working as postdoctoral researcher at Japan Atomic Energy Agency : permana.sidik@jaea.go.jp

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] P. Sidik, N. Takaki, H. Sekimoto, Feasible Region of Design Parameters for Water Cooled Thorium Breeder Reactor, J. Nucl. Sci. Technol., 44[7], 946-957, (2007).

[2] N. Takaki, P. Sidik, H. Sekimoto, Feasibility of Water Cooled Thorium Breeder Reactor Based on LWR Technology, Proceeding of the 8th International Conference GLOBAL, (2007).

[3] P. Sidik, N. Takaki, H. Sekimoto, Breeding Capability and Void Reactivity Performance of Heavy Water Cooled Thorium Reactor, J. Nucl. Sci. Technol, 45[7], 589-600, (2008).

[4] P. Sidik, N. Takaki, H. Sekimoto, Power Density Effect on Feasibility of Water Cooled Thorium Breeder Reactor, Prog. Nucl. Energy, 50, 308-313, (2008).

[5] P. Sidik, N. Takaki, H. Sekimoto, Preliminary Study on Feasibility of Large and Small Water Cooled Thorium Breeder Reactors in Equilibrium States, Prog. Nucl. Energy, 50, 319-323, (2008).

Zeta potential and particle size of Qβ phage in the different pH and ionic strength levels

Shinta Indah[1,2*], Fusheng Li[2]

[1]Department of Environmental Engineering, Andalas University, Padang 25163, Indonesia

[2] River Basin Research Center, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan

*e-mail: shintaindah@ft.unand.ac.id

Abstract. *Determinations of surface charge and size of viruses in the different water chemistry are important to study their behavior in various environmental conditions. The zeta potential and particle size of Qβ phage, as a model of virus, have been studied in the different pH and ionic strength levels. The zeta potential of Qβ phage showed a pH-dependent, with the zeta potentials becoming negatively charged as pH was increased. The isoelectric point (pI) was reached between pH 1.7 and 2.1 for 1 mM, 10 mM and 100 mM NaNO₃ ionic strengths. The zeta potentials decreased with increasing ionic strengths for pH below pI. The increasing in size, indicated aggregation, are predominant for pH < 4 for all the ionic strengths that were investigated.*

Introduction: *The ability of viral particles to adhere onto the barrier material is for a large part determined by their physico-chemical properties, e.g., their electrostatic surface charge [1]. Net virus surface charge can be assessed on the basis of zeta potential which is the electrical potential of the interfacial region between the virus surface and the aqueous environment [2]. Reaction conditions, such as pH, ionic strength, temperature, and solution components could influence the surface charge [3]. The pH values are also known to affect aggregation of viral suspension and lead therefore to an overestimation of the viral retention capacity of the barrier material [1]. The aim of this study is to investigate the effects of different pH and ionic strength levels on the zeta potential and particle size of Qβ phage, a simple RNA bacteriophage of Escherichia coli. The results will become a preliminary investigation to study the adsorption mechanism of virus at the solid-liquid interface.*

Experimental: *The bacteriophage Qβ (NBRC 20012) was obtained from the NITE Biological Research Center (NBRC, Chiba, Japan). The Qβ phage was replicated according to the standard procedure (ISO 10705-1, 1995). Zeta potential measurements were obtained by suspending Qβ phage stock solution to a concentration of approximately 10^7 PFU/ml in sodium nitrate (NaNO₃) at pH values ranging from 1-8 (adjustment with 0.1 N HCl or 0.1 N NaOH). The zeta potentials and particle size were measured by using the Zetasizer Nano ZS instrument (Malvern Instruments). For each condition, the measurements were conducted three times.*

Results: *The results showed that the zeta potentials of Qβ phage decreased with increasing pH (Fig. 1). For pH values smaller than about 2, the zeta potentials were positively charged, but negatively charged at high pH with isoelectric point (pI) between pH 1.7 and 2.1 for 1 mM, 10 mM and 100 mM NaNO₃ ionic strengths. The zeta potentials decreased with increasing the ionic strengths for pH below pI, but for pH above pI, the zeta potentials measured at 100 mM were larger in magnitude than those obtained at 1 mM and 10 mM. Fig. 3 shows the particle size (report by number) of Qβ phage that may be considered as isolated (not aggregated) in the pH range 4–8, independent of the ionic strength, whereas viral aggregated are predominant for pH < 4.*
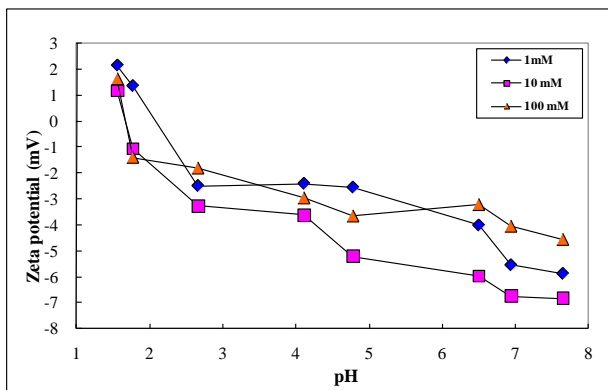
Fig. 1. Zeta potential of the Qβ phage as a function of pH under three NaNO$_3$ electrolyte concentrations.
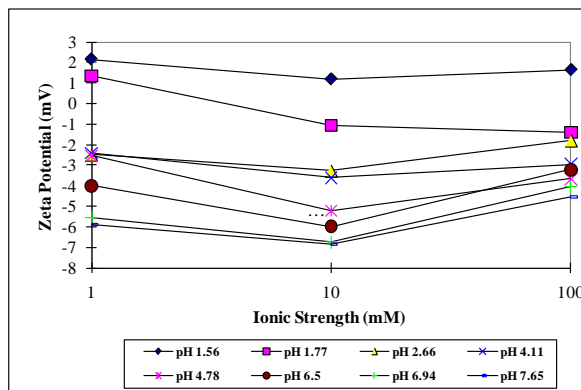
Fig. 2. Comparison of the relationship between the zeta potential of Qβ phage and the ionic strength at the various pH values.
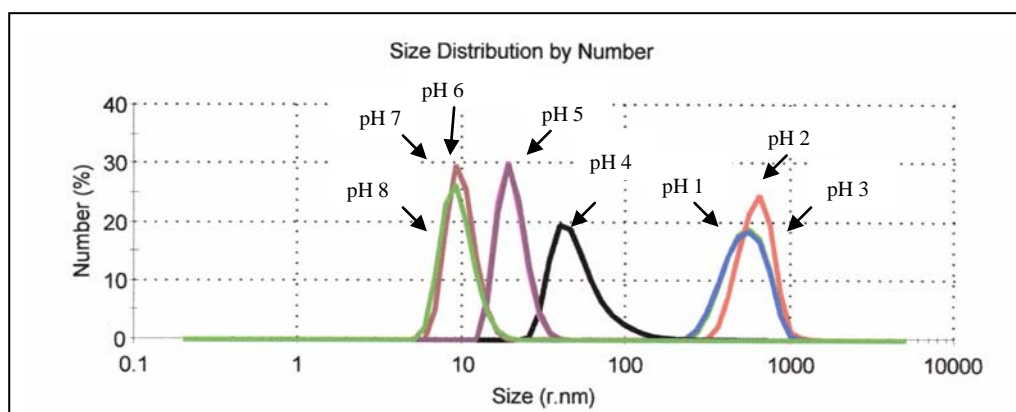
Fig.3. Particle size of Qβ phage in various pH at 1 mM NaNO$_3$ electrolyte concentration

Keywords: zeta potential, size distribution, Qβ phage

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Langlet, J., et.al. (2008). "Aggregation and surface properties of F-specific RNA phages: Implication for membrane filtration processes." Water Research, 42, 2769-2777

[2] Scahldahl, C.M., et.al. (2006). "The influence of ionic strength on the interaction of viruses with charged surface under environmental condition." J. of Colloid and Interface Science, 294, 1-10.

[3] Hsu, B.M., Huang C.   (2001), "Influence of ionic strength and pH on hydrophobicity and zeta potential of *Giardia* and *Cryptosporidium.*" Colloids and Surfaces, 201, 201–206

A Multi Agent System Approach for

Safety-Conscious Process Design of Discrete Operations

Rafael Batres[1], Tatan Firmansyah[2], Ilyas Sulaymanov[3]

[1,2,3] Toyohashi University of Technology, Japan

E-mail address: [1] *rbp@tut.jp*, [2] *tatan_firmansyah@yahoo.co.id*, [3] *ilyas_qq@yahoo.com*

Abstract. *This research presents multi agent system approach for process design in discrete operations. The current method deals with a backward induction method. The basic idea is the method starts from the end of a problem (this is desired product in this case), to determine a sequence of optimal actions that lead to that end (towards the raw materials). The main advantage of this suggestion is that it allows considering only relevant technologies to the desired product. It is assumed that equipment suppliers advertise their technologies throughout the network by using intelligent agents. The process design is carried out by cooperative distributed agents that communicate through message exchange and generate a process that is safe, cost-effective, and has a short throughput time.*

Motivation and Proposed Method: *This research presents multi agent system approach for process flow design in discrete operations. The current method introduces a backward induction method that aims at producing optimal design solution using distributed agents. The basic idea of backward induction is that design starts from the end of a problem (this is desired product in this case), and then determine a sequence of optimal actions that lead to that end (towards the raw materials). The main advantage of this approach is that it considers only technologies that lead to the desired product. In contrast, current methods often generate incomplete solutions that fail to produce the desired product. The process design is carried out by a framework composed of agents that are distributed on the computer network and cooperate by exchanging messages. The objective of the proposed approach is to choose the mix of technologies that meet product requirements and generate a process that is safe, cost-effective and has a short throughput time.*

The process design framework consists of three types of agents: Process Selection Agent (PSA), Equipment Selection Agent (ESA), and the Equipment Agents (EAs). The role of the PSA is to serve as the interface between the user and the rest of the agents. It is responsible for specifying the problem including product and raw material requirements, and production cycle requirements; constructing process flow designs and selecting the optimal process flow according to the user requirements. The ESA serves as an equipment matchmaker for the PSA. It is mainly responsible for selecting the best equipment items that meet the desired criteria costing terms of cost, throughput time or safety. The EAs are intended for managing individual equipment items and is assumed to be owned by equipment manufacturers. An EA can advertise its technology and design or specify equipment items. In order to advertise their services, agents register with the directory facilitator (DF) by providing their name, location, and service description. Once the service information is stored in the DF, agents can query the DF to find agents that match a certain service.

System Implementation and Case Study: *The multi-agent framework has been implemented in Java using the JADE (Java Agent Development Framework) library for distributed agent applications [1] and JTP (Java Theorem Prover) inference [2] system. The agent platform can be distributed across computers and other Java enabled machines. It also provides tools for monitoring and configuration of agents. The messages between agents are encoded in FIPA ACL (Agent Communication Language). The queries for equipment agents are encoded in CLIF (Common Logic Interchange Format). Agents communicate through the network using a shared knowledge representation encoded in the Web Ontology Language (OWL). Each Equipment Agent has its own knowledge base containing equipment classes, material-related constraints, design constraints and design equations.*
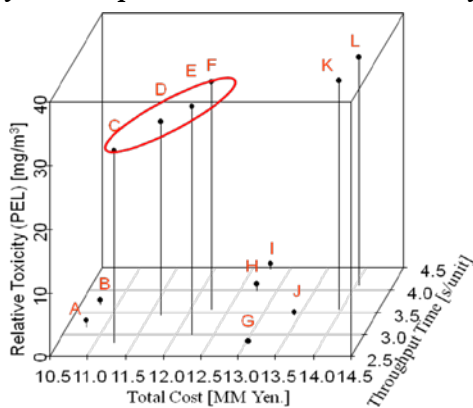
Figure 1: Process Design Alternatives

The knowledge base is encoded in OWL and is built using an upper ontology. The upper ontology defines domain-independent concepts such as physical objects, activities, mereological and topological relations, classes and relations for physical quantities [3].

As an application of the proposed methodology, we consider a design problem from the electronic industry. The objective is to assess the process design options that can produce printed circuit boards (PCBs) and select the optimal one. For this particular example, we take into account not only cost but also toxicity and throughput. Safety is evaluated in terms of the toxicity of the intermediate and final products.

Specifically, we use the Permissible Exposure Limit (PEL) which is a regulatory limit on the concentration of a substance in the air to which a person can be exposed [4]. The process design was carried out first with a total cost criterion and then with toxicity and cycle time criteria. The resulting best alternatives obtained with the three criteria are shown in Fig. 1.

Conclusion and Ongoing Work: *In this paper, we described a backward induction method which aims at selecting the best mix of technologies that meet given product and raw material requirements. The process design framework has been developed based on the assumption that equipment items are advertised, designed and specified by intelligent agents and the process flow is generated through the message exchange between agents. This new method has been tested with a case study for the fabrication of printed circuit boards. The method produces the best alternatives from which the decision maker can select the most appropriate one based on cost, toxicity and throughput time. There are several aspects that being further studied. For instance, the current approach only produces linear processes, so improvements are needed in order to manage recycles. In addition, the autonomous function of the agents is to be further improved to serve the decentralized system in achieving the goals.*

Keywords: Safety-Conscious Design, Multi-Agent System, Discrete Process

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

Books
[1] Bellifemine F. L., Giovanni C. and Greenwood C. D. (2007) *Developing Multi-Agent Systems with JADE*, John Wiley & Sons, England.

Journals
[2] Fikes R., Frank G. and Jenkins J. JTP: A System Architecture and Component Library for Hybrid Reasoning, In *Proceedings of the Seventh World Multiconference on Systemics, Cybernetics, and Informatics*, Orlando, Florida, USA, 2007.
[3] Batres R., West M., Leal D., Price D. and Naka Y. An Upper Ontology based on ISO 15926. *Computers & Chemical Engineering*, **31**, 519-534, 2007b

Internet Sources:

[4] OSHA. (2010). "*The United States Occupational Safety and Health Administration: Permissible Exposure Limits (PELs)*". < http://www.osha.gov/SLTC/pel/> (Accessed 2010-03-16).

Studi Tentang Erosi karena Kavitasi di Natrium Cair dengan Menggunakan Perangkat Tes Berbentuk Venturi

Teddy Ardiansyah[1], Makoto Asaba[2], Minoru Takahashi[3] dan Kuniaki Miura[2]

[1] Departemen Teknik Nuklir, Institut Teknologi Tokyo

ardiansyah_nuclear@yahoo.com

[2] Sukegawa Electric, Co. Ltd.

[3] Laboratorium Riset Reaktor Nuklir, Institut Teknologi Tokyo

Abstrak. *Eksperimen erosi karena kavitasi di natrium cair dengan menggunakan perangkat eksperimen berbentuk venturi telah dilakukan. Eksperimen ini menggunakan perangkat berbentuk venturi dengan diameter dalam sebesar 6.5 mm dan diameter luar sebesar 21 mm terbuat dari bahan 316 SS. Kondisi kavitasi dipertahankan pada suhu 200 derajat celcius selama 600 jam. Hasil yang didapatkan menunjukkan bahwa erosi pada permukaan eksperimen adalah dalam bentuk sumuran-sumuran (pits) dan permukaan yang tererosi. Sumuran yang terbentuk sebagian besar berdiameter 25 mikrometer. Permukaan material juga menunjukkan adanya retakan yang mungkin diakibatkan oleh pengaruh siklik akibat dari pembentukan dan kolaps gelembung-gelembung kavitasi.*

Pendahuluan: *Erosi yang disebabkan oleh kavitasi (cavitation) di natrium cair adalah salah satu masalah kritis bagi pengembangan Reaktor Cepat Berpendingin Natrium/Sodium-Cooled Fast Reactor (SFR). Kavitasi mengakibatkan efek-efek yang tidak diinginkan seperti suara yang berisik dan menggangu (noise) dan erosi pada permukaan material. Kerusakan pada material yang disebabkan oleh gelembung-gelembung kavitasi pada SFR kemungkinan dapat terjadi karena desain SFR di masa depan lebih kompak. Hal ini menyebabkan laju aliran pendingin yang dibutuhkan lebih besar dan kavitasi dapat mungkin terjadi pada kondisi lokal dimana tekanan lokal turun dibawah tekanan uap natrium cair pada suhu tertentu yang disebabkan oleh laju aliran pendingin yang besar. Kerusakan yang disebabkan oleh kavitasi jika tidak ditangani secepatnya dapat menyebabkan kegagalan pada komponen reaktor nuklir seperti retakan (crack) atau erosi parah pada permukaan material yang dapat mengakibatkan kebocoran pendingin reaktor nuklir. Oleh karena itu, studi tentang erosi yang disebabkan oleh kavitasi sangat penting untuk mengetahui seberapa jauh kerusakan yang dapat ditimbulkan oleh kavitasi pada material.*

Hasil dan Diskusi: *Perangkat tes yang digunakan pada penelitian ini berbentuk venturi dengan diameter dalam dan luar sebesar 6.5 mm dan 21 mm. Perangkat tes ini terbuat dari 316 SS karena material ini digunakan sebagai bahan kelongsong pada bahan bakar SFR. Perangkat eksperimen ini kemudian dipasang pada perangkat untai natrium cair (liquid sodium loop). Untuk eksperimen erosi pada natrium cair, suhu natrium cair dipertahankan pada 200°C. Tekanan gas argon didalam perangkat untai cair dipertahankan pada kisaran 0.05-0.1 kgf/cm², Laju aliran natrium cair dipertahankan pada kisaran 27-28 l/min. Kondisi ini setara dengan angka koefisien kavitasi sebesar 0.59-0.51 (kondisi dimana kavitasi telah berkembang tetap/developed cavitation). Kondisi ini dipertahankan selama 600 jam.*

Gambar 1 memperlihatkan hasil dari eksperimen erosi pada natrium cair selama 600 jam pada daerah hilir (downstream) perangkat tes (sampel no. 6). Observasi pada permukaan material pada kondisi hilir memperlihatkan bahwa beberapa kerusakan terjadi dalam bentuk sumuran-sumuran (pits) dengan diameter sekitar 25 µm. Sumuran ini terbentuk oleh deformasi plastik karena kolapsnya gelembung-gelembung kavitasi (collapse of cavitation bubbles). Ketika gelembung-gelembung ini kolaps karena tekanan statik yang besar pada daerah hilir, mikro jet dan gelombang kejut terbentuk yang selanjutnya akan mengikis permukaan material. Permukaan pada sampel no. 5 memperlihatkan bahwa erosi juga terjadi. Erosi ini mungkin terjadi karena gelembung-gelembung kavitasi yang mengikis permukaan material sebelum runtuh pada daerah hilir.

a

b

c
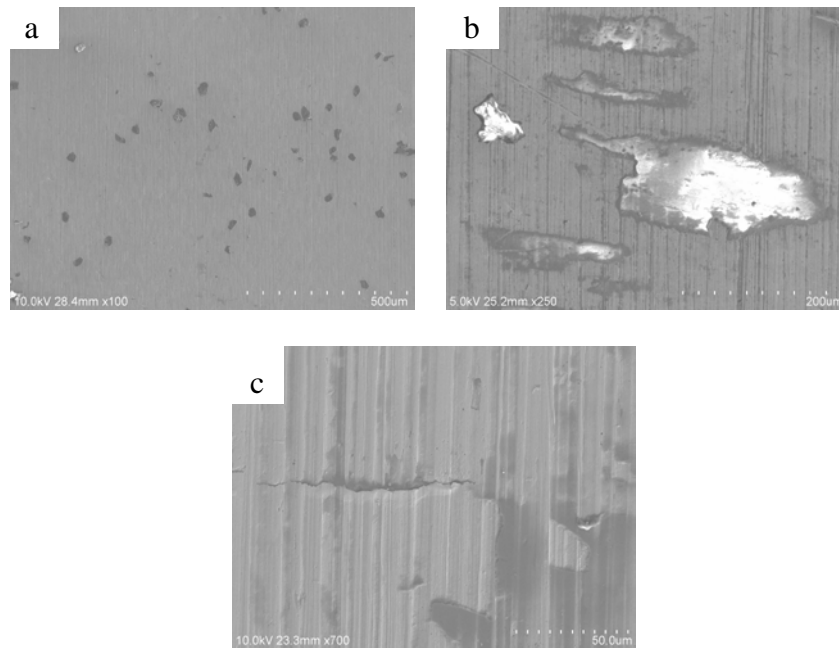
Gambar 1a) Distribusi cekungan-cekungan pada daerah hilir (sampel no. 6) b) erosi pada permukaan sampel no. 5 dan c) keretakan yang terjadi pada sampel no. 2.

Kesimpulan: *Kavitasi yang terjadi di natrium cair mengakibatkan kerusakan dalam bentuk sumuran-sumuran (pits) dan permukaan yang tererosi. Keretakan mikro juga terjadi pada permukaan material.*

Kata kunci: Kavitasi, 316 SS, Venturi, Sodium.

Kategori: *Applied Sciences/Engineering*

Media Presentasi: Oral Presentation

Referensi:

[1] T. Ardiansyah, M. Asaba, K. Miura and M. Takahashi. (2010). "Characteristics of Cavitation and Erosion Phenomena in Sodium Flow". *Proceedings of ICONE18* (CD).

Electrochemical Behaviour of Al-Mg-Si PVD Coatings on Steel Substrate

Hariyanti, G. A. El-Mahdy, A. Nishikata and T. Tsuru

Department of Metallurgy and Ceramics Science, Tokyo Institute of Technology,

2-12-1, S8-7, O-okayama, Meguro-Ku, Tokyo, 152-8552, Japan

Abstract. *Introduction: Zinc has traditionally been the metallic material most widely used to protect steel against atmospheric corrosion due its ability to afford cathodic protection to steel in all types of natural atmospherics. However, amount of zinc was not abundant. It was reported that the reserve-production ratio of zinc was about 22 years. In recent decades, Al alloys coating have been used instead of zinc in certain atmospheric application [1]. Aluminum with its air-formed passive oxide film forms an effective barrier layer against attack [2]. On the other hand, Aluminum does not show sacrificial protection for steel and its corrosion potential are relatively close to steel and hence there is very little driving force for galvanic protection. Magnesium was added to aluminum to compensate this behavior due to its superior galvanic ability for protection of the underlying surface. Magnesium is the most active metal in the galvanic series [3] and always as the active anode if it is contact with other metals. In the present work, the electrochemical behavior of Al-Mg-Si PVD coatings was investigated.*

Experimental Methods: Al-Mg-Si alloys coating were deposited onto steel sheet using vacuum evaporation. The applied currents were varied to obtain the required ratio of Al-Mg-Si in the deposited coatings. The compositions of Mg and Si in this research work were a wide range (5-25%Mg and 0-7%Si). The composition of each alloy coating was determined using electron-microprobe analysis. The anodic polarization curves were measured by potentiostat using a conventional three electrodes system. The test solution for electrochemical investigation was a mixture of 0.5 M Na$_2$SO$_4$ and 0.1 M NaCl solution.

Results and Discussion
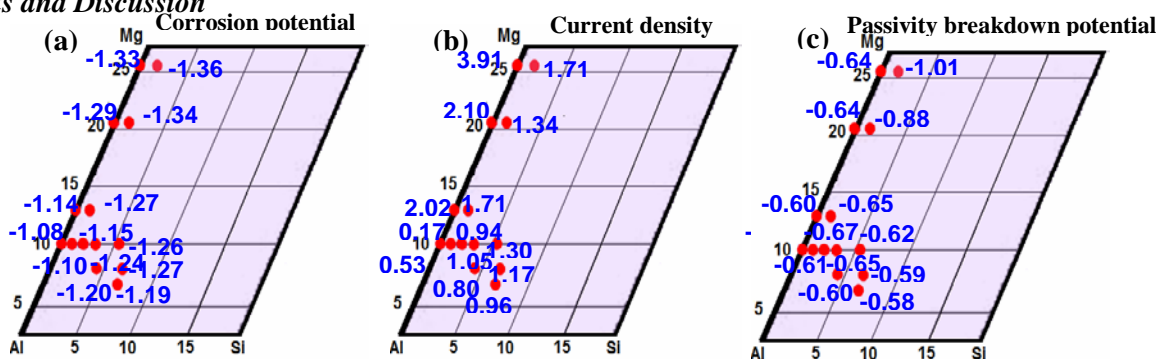
Fig. 1 Electrochemical parameters obtained from anodic polarization of Al-Mg-Si coatings (a) corrosion potential (V), (b) passive current density (μA/cm^2) and (c) passivity breakdown potential (V)

Anodic polarization curves were measured to evaluate the corrosion potential, breakdown potential of passivity and values of passive current densities of the Al-Mg-Si coatings in 0.5 M Na$_2$SO$_4$ + 0.1 M NaCl, as show in Fig. 1. The values of corrosion potential of coating were negative value about -1.2 V, indicating the ability for the cathodic protection of underlying surface. The anodic current densities also tend to increase with increasing Mg and Si content in coating. In the case of Al-Mg-Si coatings with composition of 25%Mg-2%Si, pitting occurred for the passive film, which limited their growth as evidenced by a lower breakdown potential.
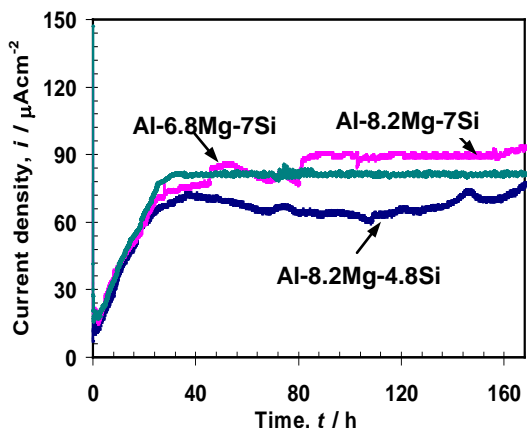
Fig. 2 Galvanic current density of Al-Mg-Si coatings during the galvanic couple test with steel in 0.5 M Na$_2$SO$_4$ + 0.1 M NaCl solution (Area ratio 10:1)

Plots of galvanic current densities of the galvanic couples between the base steels and their corresponding Al-Mg-Si coatings as a function of time are shown in Fig.2. The galvanic current density was referred to the area of steel. The values of the corrosion potential for steels were higher than those of their coatings, the coatings were more active and are expected to act as the anode when coupled to the base steel. From Fig. 2, it is observed that the densities of the galvanic current were changing gradually with time during the initial stage and then reached different steady-state values until the end of the test. It is considered that the galvanic corrosion current is influenced by galvanic corrosion potential between coatings and substrate. The increased galvanic corrosion current which is induced by a high corrosion potential difference could be resulted in early dissolution of Mg. The galvanic corrosion rate, in other words sacrificial ability in galvanic couple depends on the difference in corrosion potentials of the members in the galvanic couple and on their polarization characteristic. The galvanic current densities were about 70-80 $\mu m/cm^2$. This value is sufficient for cathodic protection of steel. It is also confirmed that the steel surface remained as bright surface after a week couple test.

Conclusions: The electrochemical data showed that the corrosion potential of the coating shifts toward more negative value and the corrosion current density increased as magnesium was increased, indicating the ability for the cathodic protection of underlying surface

Galvanic current densities in the couples formed between Al-Mg-Si alloys coating and steel were about 70-80 $\mu A/cm^{-2}$. It indicated triggering phenomenon of cathodic protection of steel by alloys coating.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] K.A. Yasakau, M.L. Zheludkevich, S.V. Lamaka, M.G.S. Ferreira, *Electrochim. Acta.* 52 (2007) pp7651.

[2] K. R. Baldwin, R.I. Baes, R.D. Arnell and C.J.E. Smith, *Corros. Sci.*, 38 (1996) pp 150.

[3] M. Pourbaix, Atlas of Electrochemical Equilibria in Aqueous Solution, Pergamon Press, Oxford, 139 (1966)

Effect of Chloride on Pitting Resistance Corrosion of Ferritic Stainless Steel

Sri Hastuty, Atsushi Nishikata, and Tooru Tsuru

Graduate School of Science and Engineering, Department of Metallurgy and Ceramics Science,

Tokyo Institute of Technology,

2-12-1, Ookayama, Meguro-ku, Tokyo. Japan. 152-8550

Email address: hastuty.s.aa@m.titech.ac.jp

Abstract. *To clarify the critical relative humidity (RH) to initiate pitting corrosion and the rusting mechanism in a marine atmospheric environment, pitting corrosion of ferritic stainless steels under drops of $MgCl_2$ solutions was investigated. A pitting corrosion test was performed at different relative humidities under droplets with various diameters and thicknesses. The probability pitting corrosion decreased as the diameter and thickness decreased. Pitting corrosion progressed only when the chloride concentration exceeded 4 M, which is the equilibrium concentration at 80%RH. Accordingly, pitting corrosion of ferritic SS could be initiated when the RH was less than 80%RH. Additionally, a pitting corrosion mechanism of ferritic stainless steel under droplets containing chloride ions is proposed.*

Introduction: Due to high nickel prices, currently a global shift from austenitic to ferritic stainless steels (SS) grades. However, ferritic SS are less corrosion resistant than austenitic, especially in marine atmospheric environments, airborne salt particles deposit on metal surface and lead to pitting that depends on chloride concentration and relative humidity (RH). Accordingly, the effect of the $[Cl^-]$ and RH on pitting needs to be clarified. In addition, at present, studies on the pitting mechanism of SS under thin electrolyte layer are in limited number, unlike studies in bulk solutions. Methods to determine pitting resistance of a metal under thin electrolyte layers are available in limited number. This study will propose a simple but powerful method and also it is very close to the actual case, marine atmospheric, and it is called droplet test.

Experimental:The polished of 430 SS plates of 50 mm x 50 mm x 3 mm were used as the specimen. 5 droplets for each combination of volumes (0.5–200μL) and $MgCl_2$ concentrations (0.5, 5, 50mM) were placed on the SS plates by using micropipette. The experiment was carried out in humidity and temperature chamber at 298 K. The pitting test consisted of two stages. At the first stage, the droplets were placed on the SS surface and kept at 95% RH for 15 h ($[Cl^-]_{equilibrium} = 2 M$). In the subsequent stage, the RH was lowered from 95% RH to 85%, 75% and 65% and then the probability of pitting occurrence in each condition was investigated.

Results and Discussion:
Effects of droplet thickness and diameter
Fig. 1 shows the effect of droplet size on the probability of occurrence of pitting corrosion at critical RH. Pit occurs more easily, as the droplet sizes increase, indicates that the cathode area may play an important role in pit initiation under a droplet.The RH also strongly affects the probability. As the RH is lower, the $[Cl^-]$ in the water droplet becomes higher, leading to an increase of the probability. No pitting was observed at 85% RH for 100 h, means the $[RH]_{critical}$ for pitting at 80%RH, corresponds to 4 M in $[Cl^-]$.

The role of MnS inclusions on pitting
It was found the MnS inclusions was ~2 μm with SEM and EPMA. Pitting under a thin solution layer initiate at a MnS inclusion and dissolves by reaction (1) and decreases the pH at the vicinity of the inclusion. The pH drop leads to the dissolution of metals (Fe, Cr). The metal ions diffuse outwards through the thin water layer and precipitate as rust and lowers the pH of the surroundings by reactions (4)–(5), leading to an increase of the corroded area. Pit growth in the horizontal direction since low pH regions are more widely formed around a pit, different compared to pit in the bulk solution.

$$2MnS + 3H_2O + 2Cl^- \rightarrow 2MnCl^+ + S_2O_3^{2-} + 6H^+ + 8e^- \quad (1)$$

$$Fe \rightarrow Fe^{2+} + 2e^- \quad (2)$$

$$Cr \rightarrow Cr^{3+} + 3e^- \quad (3)$$

$$Fe^{2+} + 2H_2O + 2Cl^- \rightarrow Fe(OH)_2 + 2HCl \quad (4)$$

$$Cr^{3+} + 3H_2O + 3Cl^- \rightarrow Cr(OH)_3 + 3HCl \quad (5)$$
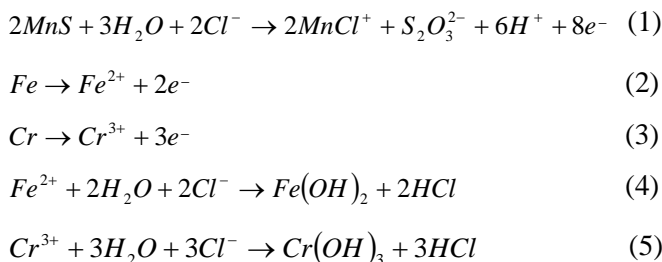
Conclusions

1. *Probability of occurrence of pitting increase with increasing the diameter and thickness of the droplet.*
2. *The [RH]$_{critical}$ of pitting corrosion of ferritic SS is at 80% corresponds to the [Cl⁻]$_{critical}$ of 4 M.*
3. *The pit formed under droplets of chloride solutions was a shallow type, indicates that the pit propagates preferentially to horizontal direction.*
4. *Droplet test is proven as a simple but effective method to determine pitting resistance of stainless steel.*
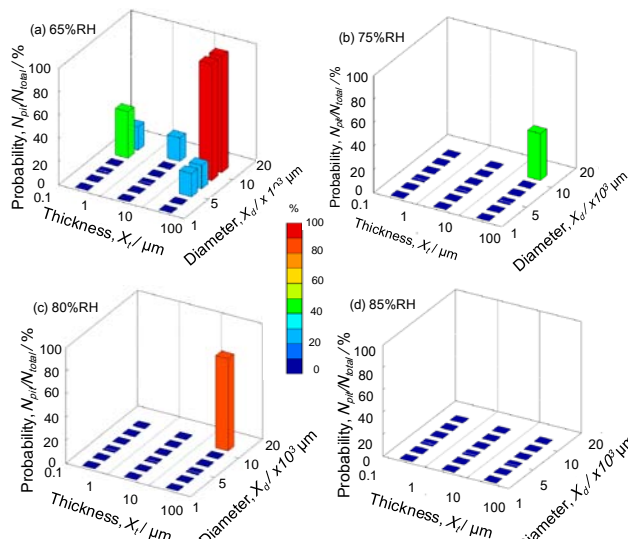
Figure 1 Probability of occurrence of pitting corrosion under MgCl$_2$ droplet at various RH.

Keywords: ferritic stainless steel, pitting corrosion, droplet, chloride concentration, relative humidity, MnS inclusion

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Y. Tsutsumi, A. Nishikata, T. Tsuru, *Corros. Sci.*, 49, 2007, 1394.

[2] P. Schmuki, H. Hildebrand, A. Friedrich, S. Virtanen, *Corros. Sci.,* 47, 2005, 1239.

Analisis Ekonomi Pemanfaatan Energi Nuklir di Indonesia

Deby Mardiansah[1]

[1] Tokai University, Hiratsuka, Japan

Email : deby.mardiansah@gmail.com

Abstrak. *Energi merupakan salah satu faktor yang dapat mendukung cepat atau lambatnya pembangunan, serta kesediaan akan energi juga mempengaruhi kemandirian sebuah negeri. Dan energi nuklir merupakan salah satu energi yang cukup menjanjikan di Indonesia karena energi nuklir (PLTN) dapat menghasilkan energi secara konstan selama masa operasi.*

Dalam kesempatan kali ini, akan dibahas mengenai analisis ekonomi PLTN dibanding pembangkit listrik dari sumber lainnya. Dalam hal analisis ekonomi terdapat 3 faktor yang mempengaruhi biaya produksi listrik per kWh yaitu biaya konstruksi, biaya perawatan, dan biaya bahan bakar. Dari hasil studi dapatkan bahwa untuk biaya konstruksi dan biaya pembangunan PLTN lebih mahal dibanding pembangkit listrik khususnya berbahan bakar fosil (seperti minyak, gas, batu bara). Akan tetapi, dari segi harga bahan bakar PLTN jauh lebih murah , sehingga secara biaya total dan biaya listrik per kWh untuk pembangkit PLTN lebih murah dibanding pembangkit listrik lainnya.

Kata Kunci: biaya konstruksi, biaya perawatan, biaya bahan bakar, PLTN

Kategori: *Applied Sciences/Engineering*

Media Presentasi: Oral Presentation

Pustaka

Buku

[1] "The Economics of The Nuclear Fuel Cycle", 1994, Nuclear Energy Agency OECD

Jurnal

[2] Shinoda Y, Ohtaki A, Kofuji H, 2001, "Study of Evaluation of Fast Reactor Cycle", JAEA: Japans

Mass Exchange in an Embayment with Two Entrances

Eka Oktariyanto Nugroho[1] and Akihiro Tominaga[1]

[1] Dept. of Civil and Environmental Engineering Nagoya Institute of Technology

Email address: nugrohoeka@yahoo.com

Abstract. An embayment along the riverside is contributing to provide and maintain the ecological process from the environmental point of view. The exchange processes between a dead zone in the embayment and the main channel gives the most important role for maintaining wide variety of fauna and flora in the river. It means that the riverside embayment is expected to provide preferable environment for natural lives.

In natural river, owing to a dead zone formed in the space and rather slow velocity, sediment tends to be deposited in the space and it becomes shallower. It results in a narrow entrance on the connection between main channel and dead-water zone. From the practical engineering, that connection also often found as a partially closed partition made by artificial works.

A few researchers treated the partially blocked side cavity and analyzed the exchange processes on their experiment. Tominaga et al.[3,4] investigated the mass exchange in the embayment with single entrance, by using dye injection method. They found out that the water exchange rate is generally proportional to the velocity scale in the embayment area but it was affected by intermittent and three dimensional flow structures. Nugroho et al.[5] conducted several variations of the length, the width and location of the single entrance. They reported the relation between the location, width and length of the entrance. The downstream entrance gives the most effective of mass and momentum exchange because the wall in the downstream entrance guides the flow into the embayment whereas the flow of upstream and middlestream entrances are found to be diffused by fluid boundaries so that the mass and momentum exchanges are smaller than downstream entrance. They also found that the entrance length and width have an effect in the decreasing of mass and momentum transport between the main channel and the embayment when the entrance length is longer and the entrance width is narrow. Another information of mass and momentum exchange in an embayment are gained from the open embayment result's which the interface between main channel and the embayment is found to be open interface. Muto et al.[1] found that the exchange coefficient of mass and momentum are more effective in the ratio L/D=3 than the square embayment case due to instability of the dominant circulating flow formed in the embayment. Brevis et al. [2] reported the location of the main source for turbulent mass exchange is located at the channel-embayment interface, were Kelvin-Helmholtz instabilities are generated.

In this study, we investigated the effect of the width and length of the entrance on the mass exchange in the case of two entrances at the interface between embayment and main stream experimentally by using PIV method (Fig.1). Experiments were conducted in a tilting straight rectangular channel with 8m length, 0.3m width with an adjustable slope. The slope of the flume S was set as 1/1000. The test section was located 4 m downstream from the entrance. The experiments were carried out in 9 cases. In all cases, the discharge Q was 0.00156m³/s and the water depth h was set to 0.04m by adjusting the downstream weir. The mean velocity was 0.260m/s, Froude number was 0.42 and Reynolds number was 10400.   In order to quantify the exchange processes, velocity distributions in the main channel-embayment interface were measured using a particle image velocimetry (PIV) technique. In the present analysis, the flow velocities were calculated by PIV using about 3200 successive images in 16s with an interval of 1/200s.

In the case considered, such as the embayment attached to a straight channel, the lateral exchange between the embayment and the main flow region through the interface layer is most predominant. Thus the lateral components of velocity and shear stress play important roles. This
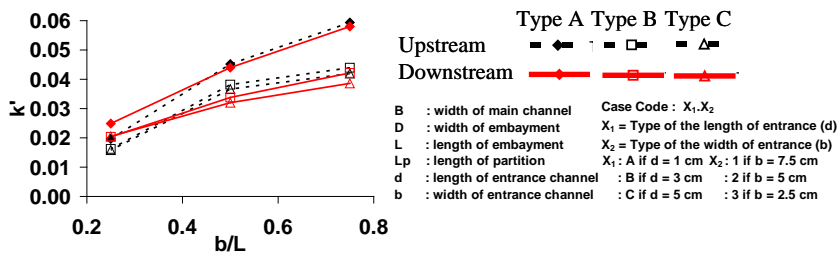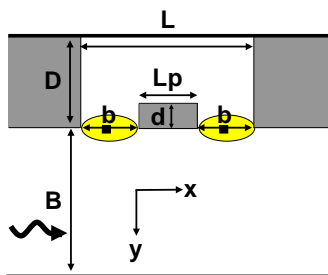
Fig.1 Variations of experiment and the encoding.   **Fig.2** Mass exchange coefficient for all cases.

lateral component contributes to mass exchange whereas the shear stress contributes to momentum transfer.

The estimated exchange coefficients are shown in Fig 2. Fig.2 shows that the mass exchange coefficients decrease when the entrance width (b/L) becomes narrow in all cases. As a result, we can conclude that the effect of increasing the entrance length (d/D) is found to be having similar pattern at $b/L \geq 0.5$ which is the mass exchange becomes smaller as the entrance length becomes longer and always bigger in the upstream entrance than the downstream entrance. In contrary, the mass exchange gives the opposite result when the width of the entrance becomes narrow (b/L=0.25). In that case, the mass exchange in the downstream entrance is bigger than the upstream entrance. The result of these experiments also tells us that the mass exchange is influenced dominantly by entrance width rather than the entrance length. This basic concept is useful for the embayment design. Since we have instantaneous velocity data for all case, the interpretation of velocity field data will be used in the further analysis.

Keywords: Mass, Exchange, Embayment, Two Entrances, Partially blocked.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Muto, Y., Imamoto, H., and Ishigaki T. （2000）. "Velocity measurements in a straight open channel with arectangular embayment." *Proceeding of 12th Congress of APD-IAHR*, Bangkok, Thailand, 353-362.

[2] Brevis, W., Niño, Y., Vargas, J. (2006). "Experimental characterization and visualization of mass exchange process in dead zones in rivers." *Proceedings of the International conference on fluvial hydraulics*, Lisbon, Portugal, 235-242.

[3] Tominaga, A. and Jong, J.: Effects of conjunction channel on water exchange in riverside embayment, *2nd International Symposium on Shallow flows*, Hongkong, 2008.

[4] Tominaga, A. and Nugroho, E. O. "Effects of inlet configuration on water exchange in closed embayment." *Annual Journal of Hydraulic Engineering, JSCE*, Vol.53.

[5] Nugroho, E. O. and Tominaga, A. (2010). "Turbulence characteristics in an embayment with various entrance configurations." *Annual Journal of Hydraulic Engineering, JSCE*, Vol.54.

Core Disruptive Accidents of Liquid Metal Fast Reactors Simulation with Moving Particle Method

Rida SN Mahmudah[1]

[1] Kyushu University, 744 Motooka Nishiku Fukuoka 8190395

Email : rida@nucl.kyushu-u.ac.jp

Abstract. *The needs of energy for human race will rise along with the history of human itself. The declining of oil and coal resources and in effort to get a sustainable, clean and cheap energy lead us to find other energy resources such as solar, wind, geothermal and nuclear. Nuclear energy, built in form of Nuclear Power Plant (NPP) has been chosen as one of promising energy resources at the present and future. Begin to operate at 1950s, the NPP has been supplying approximately 18% of energy demand in all over the world. An NPP uses nuclear fuel and produces much more power per unit weight of nuclear fuel than conventional energy sources like coal an oil. It doesn't release harmful carbon emission to the air that contributes to pollution and climate change problem. NPP operates effectively, reliably and cheaply. Since 1987 the cost of producing electricity from an NPP has reduced from 3.63 cents per KWHr to 168 cents per KWHr in 2004[11]. With many advantages from other energy resources, NPP's technologies has been largely developed and studied for the past decades. It has developed into reactor generation II, III and VI. Liquid metal fast reactor (LMFR) is one of advanced type of generation VI of nuclear reactors. With the breeding systems, the LMFR can ensure a sustainable long term fissile fuel supply. In addition, the use of LMFRs allows the recycling of the minor actinides content of nuclear waste and burning them to produce energy and reduce the amounts of disposed waste. It is also has an advantage of higher thermal efficiency compared with water-cooled reactors. As the future NPP type, a comprehensive study of core disruptive accidents (CDA) of LMFR is a necessity. Hypothetically, there are two main accidents in LMFBR, loss of flow (LOF) and transient overpower (TOP) accidents. The first accident is due to the slow flowing of coolant and the latter is power increase beyond control. Both of these will lead to increase of core temperature which will lead to other accident sequences, such as cladding melting, disruption of fuel, and fuel release into coolant. It would be difficult for conventional mesh methods to directly simulate such complicated accidents sequences, which usually involve multiphase flow with phase change. Moving particle method is recommended to simulate such behavior in CDAs. There are several moving particle methods, which are a fully lagrangian method, has been developed in the recent years. The methods are smoothed particle hydrodynamics[2], moving particle semi implicit method[3], finite volume particle method[4], etc. Unlike mesh methods, there is no need to construct mesh or interface in the moving particle methods, because each moving particle represents each phase with specific physical properties. In this study, a 3D code using finite volume particle (FVP) method was developed to simulate a molten freezing on flow channel, which is one of common phenomena at CDA. In the FVP method, which adopts the same concept as the conventional finite volume method, each particle is assumed to occupy a certain volume. The control volume of one moving particle is a sphere in 3D simulations. Using the Gauss's law, the FVP discretization of gradient and Laplacian operator can be obtained. This discretization is used to solve the governing equation of incompressible flow, which are consists of mass conservation equation, momentum conservation equation and energy conservation equation. In FVP, the motions of each particle and heat transfer between particles are calculated through interaction with its neighboring particles. The interaction between particles is weighted by a kernel function, which calculates the surface interaction area between particles. The calculation is solved using combined and unified procedure algorithm[5], while the poisson pressure equation is solved using ICCG. To verify the developed code, a series of molten freezing experiment was*

conducted. The experiment was to flow the molten wood's metal (freezing temperature 78.8ºC) into L-shaped conduction wall which was inclined with certain angle. Due to heat transfer between hot molten wood's metal and the wall, the flowing molten wood's metal will eventually freeze and penetrate the wall. The experiment was conducted with various parameters, such as molten wood's metal volume and initial temperature, inclination angle and conduction wall material. The result comparison of penetration length and freezing time of molten wood's metal in experiment and simulation shows reasonably good agreement. Both the experiment and simulation of molten wood's metal freezing on channel flow that were conducted in various parameters are appropriate with fundamental behaviors of freezing phenomena. This result concludes that FVP can successfully simulate the freezing of molten metal on flow channel and can possibly be used to simulate other accident sequences of CDA.

Keywords: core disruptive accidents, LMFR, moving particle method

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

Internet Sources:

[1] "Everything you want to know about Nuclear Power" *<http://nuclearinfo.net/>* (Accessed at July. 29, 2010).

Journals

[2] J.Monaghan, Smoothed particle hydrodynamics, Rep.Prog. Phys, 68 (2005)1703–1759.

[3] S.Koshizuka et al., Moving-particle semi-implicit method for fragmentation of incompressible fluid, Nucl. Sci.Eng, 123(1996) 421.

[4] K.Yabushita et al., A finite volume particle method for an incompressible fluid flow, Proceeding of Computational Engineering Conference, 10 (2005) 419-421.

[5] T. Yabe et al., An algorithm for simulating solid objects suspended in stratified flow, Computer Physics Communications, 102 (1997) 147-160.

IDENTIFIKASI BENTUK
ARSITEKTUR TRADISIONAL MOLOKU KIE RAHA

Mustamin Rahim

Dosen Arsitektur Universitas Khairun Ternate, Indonesia

dan Graduate School of Engineering Gifu University, Japan

email: mustamin_rahim@yahoo.co.id

Abstract. *The objectives of study are to indetify the typology, characteristics, and philosophy of traditional architecture in the region of North Maluku, known "Moloku Kie Raha". Research method used was qualitative research through the architectural and historical approaches. Result founded indicate that the typhology and characteristics of traditional houses there are differences in each area, but generally, architecture of traditional Moloku Kie Raha based on the human body analogy as a philosophy and size of buildings, and consists of three main parts of the building: feet, body, and head.*

Konstruksi Bangunan: Pondasi Bangunan: Pondasi bangunan diibaratkan layaknya kaki manusia terdiri dari pondasi susunan batu (sengkedan) dan pondasi kayu yang ditinggikan diatas umpak batu. Jenis pondasi yang digunakan sesuai lokasi bangunan. Daerah pegunungan, menggunakan jenis pondasi kayu dengan umpak batu utuh. Kayu yang ditinggikan di atas batu, menciptakan lantai yang tinggi pula, sehingga membentuk rumah panggung. Daerah landai, lembah, dan tepi pantai menggunakan jenis pondasi susunan batu tanpa perekat (spesi) serta lantai bangunan tidak ditinggikan. Pada perkembangan selanjutnya pondasi mulai menggunakan batu kali dengan perekat berupa campuran hasil pembakaran batu kapur atau batu karang yang disebut kalero, dinding mengunakan campuran kerikil, pasir dan kalero, ditengah dinding menggunakan tulangan dari bilah-bilah bambu.

Badan Bangunan: Badan bangunan pada rumah tradisional adalah dinding bangunan terdiri dari konstruksi, material, dan ornamen pada dinding dan ruangan. Konstruksi dinding menggunakan rangka (skeleton) dan sistem sambungan menggunakan pasak atau diikat. Ada yang menggunakan sistem knock down yang bisa dibongkar dan dirakit kembali. Dinding terbuat dari bambu berbentuk anyaman. Jarak antara lembaran dinding diperkuat tiang kayu atau bambu. Ukuran yang dipakai berdasarkan proporsi tubuh manusia (tapak kaki, jengkal tangan, dan depa). Tinggi bangunan sesuai tinggi tubuh wanita dewasa. Pola keruangan umumnya terdiri atas ruang tamu, kamar tidur, penyimpanan benda pusaka/adat dan dapur yang terpisah dari bangunan utama [1].

Atap Bangunan: Atap diibaratkan kepala manusia sebagai bagian yang paling tinggi kedudukannya. Bentuk atap bervariasi, di Ternate dikenal dengan atap patah atau dibengkokkan sedangkan pada rumah tradisional Sasadu atap sebagai perwujudan perahu kesultanan (kagunga). Sruktur rangka atap umumnya menggunakan kayu, ada juga yang menggunakan bambu dengan sistem rangka yang menyatu dengan rangka dinding. Bahan penutup atap menggunakan daun sagu dan ijuk. Ukuran daun sagu didasari pada ukuran satu bentang tangan manusia (depa) [4].

Rumah Tradisional: Rumah Adat Sasadu: Terdapat di Kabupaten Halmahera Barat berfungsi sebagai tempat bermusyawarah. Denah Rumah Sasadu berbentuk segi delapan yang terbagi atas dua susunan antara lain : (a) Ruang samping yang mengelilingi ruang tengah berbentuk segi delapan dengan 12 tiang. (b)   Ruang tengah berbentuk empat persegi panjang dengan 8 tiang utama.   Lantai terbuat dari timbunan tanah yang dipadatkan dengan susunan batu kali sebagai penahan tanah yang berbentuk segi delapan mengikuti bentuk areal bangunan. Orientasi bangunan harus memanjang dari Timur ke Barat. Ukuran panjang dan lebar rumah harus mengikuti ketentuan khusus yang teleh di sepakati, satuan ukuran yang digunakan adalah depa, ukuran panjang maupun lebar harus ditambah ukuran ganjil misalnya ditambah 1,3,5,7, dan 9, penambahan ukuran ganjil ini merupakan kepercayaan masyarakat setempat agar kehidupannya tetap berkesinambungan dalam wujud keturunan dan rejeki keluarga masyarakat desa. Tiang

terbuat dari kayu, bambu sebagai rangka atap dan alas lantai (degu-degu), atap dari daun rumbia, dan tali ijuk sebagai pengikat.

Bentuk bagian atas sasadu terdiri dari susunan atap dengan kemiringan rendah mengelilingi atap tengah berbentuk segi tiga sama kaki yang tinggi lancip dan terdapat hiasan najung perahu (kalulu) pada kedua ujung bubungan, hal ini menggambarkan bahwa arsitektur sasadu merupakan arsitektur masyarakat perahu [2].

Rumah Adat Folajikusesurabi: Berada di desa Gurabunga Kota Tidore berfungsi sebagai tempat pengobatan supranatural dan penyembahan yang bersifat magis. Denah berbentuk segi empat, ruang terdiri dari: teras, ruang tamu sebagai tempat untuk menerima tamu kehormatan, Salai Jin (tarian Jin), dan bermusyawarah, 2 kamar tidur, ruang Puji (tempat penyimpanan peralatan upacara adat), dan ruang dapur. Material bangunan sebahagian besar menggunakan bambu seperti: pondasi, dinding, dan atap, tetapi ada juga yang menggunakan pondasi batu kali yang langsung ditumpuk tanpa campuran. Pada perkembangan berikutnya beberapa rumah adat yang telah direnovasi menggunakan campuran semen untuk pembuatan pondasi, di atas pondasi diletakkan bambu sebagai penopang dinding berfungsi sebagai sloof. Konstruksi rumah bagian atas tidak mempunyai tiang nok, atapnya dari bambu utuh, tali ijuk digunakan sebagai pengikat, bahan penutup atap dari daun sagu.

Ukuran yang digunakan sesuai proporsi tubuh manusia baik perempuan maupun laki-laki; tapak kaki, jengkal tangan dan depa. Dalam pengukuran denah bangunan harus ukuran ganjil, misalnya panjang 7 depa + sejengkal tangan + satu tapak kaki, lebar 5 depa + sejengkal tangan + 1 tapak kaki. Kadang-kadang untuk ukuran panjang ditambah 1 jengkal laki-laki dan untuk lebar 1 jengkal perempuan [2].

Kesimpulan: *Arsitektur rumah tradisional Moloku Kie Raha menggunakan proporsi tubuh manusia sebagai filosofi dan ukuran bangunan, atap rumah adat Sasadu sebagai perwujudan perahu kesultanan (kagunga). Material bangunan umumnya menggunakan bahan alami sesuai dengan lingkungan dimana rumah berada seperti kayu, bambu, daun rumbia, tali ijuk, batu kali, pasir dan kalero. Rumah tradisional Moloku Kie terdiri atas tiga bagian utama yang mengikuti bentuk tubuh manusia, yaitu: kaki, badan, dan kepala...*

Kata Kunci: Architecture, philosophy, Moloku Kie Raha

Kategori: *Applied Sciences/Engineering*

Media Presentasi: Oral Presentation

Daftar Pustaka

[1] Ibrahim, M. dan Rahim, M. 2009. Tipologi Arsitektur Tradisional Daerah Maluku Utara. *Proceeding SENVAR 10*, Manado Indonesia.

[2] Rahim, M. dan Paputungan, S. Studi Arsitektur Tradisional Rumah Adat Tidore Maluku Utara, Jurnal *Rekanologi* Fakultas Teknik Universitas Khairun Ternate. Vol.3 No.6, September 2008.

[3] Sjah, Nukila. 2005. *Rumah adat Sasadu sebagai Wujud Refleksi Budaya Masyarakat Maluku Utara*, Universitas Parahyangan, Bandung.

[4] Tim Survey, 1998. *Laporan Apresiasi Arsitektur Daerah Maluku*. Dinas Pekerjaan Umum Propinsi Maluku.

Power Distribution Control Development from Multiple Biogas Productions Based on Cocoa Beans' Waste Processing Resources in South Sulawesi Province

Risvan Dirza[1], Chandra Jinata[2]

[1]School of Electrical Engineering and Informatics, [2]School of Life Sciences and Technology,

Bandung Institute of Technology, Ganesha 10 Bandung 40132, West Java, Indonesia

Email address: ris_frans87@yahoo.com, chandra28288@hotmail.com

Abstract. *Electricity demand in Indonesia was predicted to increase until 300 GWh by 2025 (The Indonesian Institute of Sciences, 2004); therefore, Indonesia needs more electrical supply capacity in the next years. Most of electrical generators were built based on coal fuel in Java-Bali Islands. Expecting of power distribution from Java-Bali Islands is inefficient, because disperse Indonesia's geographical topography may decrease distribution electrical power quality, especially inter-island. From these phenomena, it is essential for every region in Indonesia to be independent in fulfilling its electricity needs in the future.*

Indonesia has abundant natural resources; one of them is cocoa plant. The most productive area of cocoa plantation is Sulawesi Island, by around 8.5% contribution to world's cocoa beans demand annually; in more specific, South Sulawesi Province itself gives approximately 5% or about 168,800 tons (Executive Committee of International Cocoa Organization, 2006; Yasa, 2006). Cocoa beans processing industry results around 595,000 tons of cocoa shell waste annually in South Sulawesi Province itself; moreover, this number is going to increase 3.7% per annum by world's cocoa beans demand uplift in the future. Because of this abundance, it is potential to utilize the waste to the purpose of energy conversion; therefore, South Sulawesi Province is the most suitable region for development of biogas plant. Biogas produced from cocoa shell fermentation later will be converted to electricity to supply alternative energy needs there.

Method: *It is necessary to obtain simpler sugars before core fermentation process begins by liquefying and degrading cocoa shell's sugar complexes. Then inside precise-designed bioreactors, simpler sugars are used as substrates in the core fermentation process which consists of four stages: hydrolysis, anaerobic fermentation, acetogenesis, and methanogenesis. Fermentation control and optimization systems have to be monitored at each stage; generally fermentation process ends after 30 days of retention time. At methanogenesis stage, biogas will be produced; it is separated from bioreactor and converted to electricity by utilizing gas turbines and internal combustion engines (Madigan and Martinko, 2006).*

The sustainability of this energy generation is vulnerable because of its dependency of cocoa production rate; therefore, it is expected that biogas power plants are built in well-distributed manner, so that they can mutually support one another. In addition, it is important that each of plant has Battery Energy Storage System (BESS) support in particular configuration to stabilize generated power, so it becomes dispatchable (Chandy, et al., 2010). An Optimization Approach to Power Network can be implemented as solution for this purpose.

Estimated Results and Conclusion: *Abundant Indonesia's natural resource, such as cocoa shell waste, is prospectus as an alternative of bioenergy base material. From its controlled and optimized fermentation process and combined with well management of electrical power distribution control, it is predicted by 2020 this electricity may fulfill around 1% of South Sulawesi Province's electricity demand. Other advantages from this utilization are organic fertilizer and livestock feed additive productions and also environmental sustainability improvement by industrial waste reduction. In conclusion, it is essential to start initiating Indonesian region's independence of energy by optimizing of local potentials.*

Keywords: South Sulawesi Province, cocoa, fermentation, biogas, Optimization Approach, Power Network

Category: *Applied sciences and Engineering*

Presentation Media: Oral Presentation

References

Book

[1] Madigan, M. T., and J. M. Martinko. (2006). *Brock Biology of Microorganisms 11th Edition*. New Jersey: Pearson.

Journal

[2] Chandy, K. M., S. H. Low, U. Topcu, and H. Xu. (2010). A Simple Optimal Power Flow Model with Energy Storage. *CDC*.

Internet Sources

[3] Executive Committee of International Cocoa Organization. (2006). *Annual Forecast of Production and Consumption and Estimates of Production Levels to Achieve Equilibrium in the World Cocoa Market*.

[4] The Indonesian Institute of Sciences. (2004). *Proyeksi Kebutuhan Energi Nasional Tahun 2025*.

[5] Yasa, I. W. (2006). *Beans Indonesian Cocoa: Current Situation*. Indonesian Cocoa Farmer Association, Indonesian Cocoa Board (ICB).

Determination of Arsenic in Coal Fly Ash by Graphite Furnace Atomic Absorption Spectroscopy for Direct Solid Sampling System

Sri Hartuti[1*], Shinji Kambara[2]

[1]Graduate School of Engineering, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan

[2] Graduate School of Engineering, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan

[*]e-mail: amy_srihartuti@yahoo.co.id

Abstract. *The discharge of fly ash from coal combustion process in coal fired power plants has become a matter of concern in the world over last few decades. Arsenic (As) as one of the most highly toxic chemical which is contained in coal fly ash gives negative impacts on human health and global environment, it is a semi-metal element, commonly found as arsenide and in arsenate compounds, odorless, tasteless, and notoriously poisonous metalloid and dangerous for the environment with many allotropic forms. The graphite furnace atomic absorption spectroscopy (GF-AAS) method has been proposed for direct determination of element in solid sample since its appearance as a good alternative to wet methods of analysis in many matrices (A. Sahuquillo, et.al., 2003). The main advantages of this method are its low detection limits, the minimum sample manipulation, more efficient and reliable, faster, easier, more cost-effective and less time-consuming than other methods (U. Kurfurst, 1998). Determination of arsenic concentration in coal fly ash was conducted by atomic absorption spectrometer (novAA 400, Analytik Jena) in the wavelength 193.7 nm, slit width and lamp current of Hollow Chatode Lamp are 0.8 nm and 6.0 mA respectively, and integration time is 4.5 s. The steps of the furnace program were run in drying, pyrolysis, autozero, automize, and cleanout step in corresponding temperatures. The Calibration curve was constructed directly and the concentrations of samples obtained automatically on output device by the data system. Three samples of coal fly ash (sample 1, 2, 3) were imported from distinct Indonesian coal mines (East Kalimantan, Indonesia). The result obtained for sample 1, sample 2, sample 3 were 19.69 mg/kg, 13.58 mg/kg, 3.539 mg/kg, respectively. These results showed that the graphite furnace atomic absorption spectroscopy (GF-AAS) can be used for direct solid sample to determine the concentration of arsenic in coal fly ash and the analysis obtained in solid sample make the technique useful for environmental purposes. The results will become as a preliminary investigation to study the leaching processes of total arsenic in coal fly ash from distinct coal mines in Indonesia.*

Keywords: Arsenic, Coal fly ash, GF-AAS

Category : *Applied Sciences and Engineering*

Presentation Media : Oral Presentation

References

[1]   A. Sahuquillo, et.al. (2003). "Solid sample graphite furnace atomic absorption spectroscopy for supporting arsenic determination in sediments following a sequential extraction procedure". *Analytica Chimica Acta* 476, 15-24.

[2]   U. Kurfurst (Ed.) (1998).   *Solid Sample Analysis-Direct and Slurry Sampling Using GF-AAS and ETV-ICP,* Berlin.

Decay Heat and Spontaneous Fission Neutron of Isotopic Plutonium in LWR Spent Fuels

Sidik Permana[12], Azizul Khakim[2], Deby Mardiansyah[3]

[1] **Bandung Institute of Technology,** [2]**Tokyo Institute of Technology,** [3] **Tokai University**

psidik@gmail.com

Abstract. *Productions of nuclear fuel from spent fuel of the reactors have being intensively safeguarded by the IAEA to make sure all nuclear facilities including reprocessing facilities are used for peaceful usage only. To reduce the potential risk from civilian reactors which can reach some certain potential weapon grade compositions, including extrinsic nuclear nonproliferation, intrinsic aspects are also pursued based on the material barrier capability. Maintaining fuel production of the reactor operations including criticality and fuel breeding production are the main topic for fuel sustainability as well as energy security issue, while another issue with related to reduce the potential risk of nuclear fuel utilization for making nuclear explosive should be also strengthened which actually is caused by the fuel breeding and utilization programs from recycled spent fuels. Increasing the intrinsic properties of Plutonium isotopes such as higher material barrier of even mass number (Pu-238, Pu-240 and Pu-242) which related to their decay heat and spontaneous fission neutron [1-4] is one of the hot issues to increase the technical difficulty for making nuclear explosive devices. Discharged fuel burnup and decay time effects on material barrier of isotopic plutonium compositions based on spent fuel of light water reactor (LWR) type have been evaluated in this present study. Irradiation time which relates to discharged fuel burnup value are varied 33 GWd/t, 50 GWd/t and 60 GWd/t. Fuel compositions are also evaluated after its fuel are discharged from the reactors for several decay times from 1 years to 30 years cooling time. An ORIGEN code [5] for typical LWR type is used to analyze the burnup and decay time of the reactors.Material barrier analysis is employed based on the plutonium proliferation resistance level. The level of proliferation resistance can be estimated from the isotopic plutonium vector compositions. Plutonium isotopes composition as a vector composition which means each isotopic plutonium composition has a fraction level of total plutonium content. This analysis was employed to evaluate simply the level of plutonium compositions which can be categorized as several plutonium grades [2-4]. Main parameters for investigating the material barriers are based on decay heat (DH) activity and composition of spontaneous fission neutron (SFN). Those compositions of DH and SFN are varied and it's sensitive to the composition of isotopic plutonium vector especially to the composition of even mass plutonium such as Pu-238, Pu-240 and Pu-242. Actinide compositions of LWR type are investigated during reactor operation and during decay time and will be shown and discussed those obtained results focused on plutonium isotopes compositions. Increasing discharged fuel burnup which requires more fissile material for maintaining criticality affects to the increase of even mass plutonium compositions, while fissile Pu-239 decreases with increasing burnup because of more fissile Pu-239 are consumed for higher burnup. High decay heat composition is shown by Pu-238 and higher spontaneous fission composition can be obtained by higher contribution of Pu-240 followed by Pu-242 and Pu-238. Higher burnup is effective to increase the level of DH and SFN compositions. Longer decay time affects to the increase of SFN compositions because of its dependency to all even mass plutonium which give higher composition for longer decay time. In addition, longer decay time gives less DH compositions because of its dependency to the contribution of Pu-238 which shows less composition for longer decay time.*

Keywords: nuclear nonproliferation, material barrier, isotopic plutonium, decay heat, spontaneous fission neutron.

Category: *Aplied Sciences/Engineering*

---

[2] Recently working as postdoctoral researcher at Japan Atomic Energy Agency : permana.sidik@jaea.go.jp

Presentation Media: Oral Presentation

References

[1] M. Saito, et al., Multi-Component Self-Consistent Nuclear Energy System for Sustainable Growth, Progress in Nuclear Energy, 40[3-4], 365 (2002)

[2] International Atomic Energy Agency, Information Circular, INFCIRC/153, (1972)

[3] B. Pellaud, Proliferation aspects of Plutonium recycling, *J. Nucl. Mater. Managements*, XXXI[1],30-38 (2002

[4] G. Kessler, Plutonium denaturing by Pu-238, *Nucl. Sci. and Eng.*, 155, 53-73 (2007)

[5] S. B. Ludwig and A. G. Croff., ORIGEN 2.2 Isotope Generation and Depletion Code Matrix Exponential Method, Oak Ridge National Laboratory, (2002)

Degradation Potential of 17β-estradiol (E2) in Batch Experiment by Biofilm of Slow Sand Filtration

Denny Helard [1,2*], Hirotaka Tanaka [2], Fusheng Li [3]

[1]Department of Environmental Engineering, Andalas University, Padang 25163, Indonesia

[2]Graduate School of Engineering, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan

[3] River Basin Research Center, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan

[*]e-mail: dennyhelard@ft.unand.ac.id

Abstract. *The presence of 17β-estradiol (E2), one of natural estrogens, in natural water environment, including rivers and lake, implies that E2 and its associated conjugated are not entirely removed in conventional sewage treatment plants (STPs). Batch degradation experiments using detached biofilm from slow sand filtration were conducted, and the degradation of E2 by mirobes populated in the film was confirmed. The results verified that, within the biofim of the slow sand filtration used for treating less polluted river water, there are, if not all, some microbial types that could degrade the targeted natural estrogen.*

Introduction: Slow sand filtration is a process used to treat water containing low content of turbidity and organic matter. The thickness and activity of the biofilm formed on the sand media determine its overall performance [1]. So far, lot of research has been conducted on the removal of turbidity and biodegradable organic matter contained in less polluted surface water; however, little is known about the biodegradability of natural estrogens, such as 17β-estradiol (E2), by biofilm formed on the sand media, and thus the fate of these greatly concerned compounds in the slow sand filtration process. Accordingly, the aim of this study was to investigate the degradation potential of E2 by biofilm formed in a practical slow sand filtration used to treat a surface river water, the degradability change along the vertical direction of the filter was also studied.

Experimental: Core sand samples were collected using a core sampler that allows collecting sand layers for a vertical depth up to 20 cm from the bed surface, without disturbing the stratification structure of the filter bed, from a slow sand filtration operated for treating a river water with a turbidity of about 2 NTU and a low content of dissolved organic matter of about 2.9 mg/L as DOC. The collected sand core was divided into ten layers, with a thickness of 2 cm for each layer. For each divided sand layer, the biofilm attached on the sand media was detached into the filtered water of the sand filter, and after separation of the sand particles, the solution that contained the detached biofilm was subjected to measurement of SS, VSS, and microbial number concentrations, and to batch degradation experiments for E2. Batch degradation experiments were performed using glass reactors (500 mL glass flasks) placed on shaker at 120 rpm and 20°C using the detached solution related to the layers of 0-2, 2-4, 6-8, 14-16 and 18-20 cm, respectively. The concentration of the biofilm related SS in each reactor was adjusted to 500 mg/L as MLSS, and the initial concentration of E2 was 30. 10 mL of the mixed liquor was sampled each time and the remaining concentration of E2 and E1 (by product of E2) was analyzed using an Agilent 1100 series LC/MSD system (HP1100MSD, California, USA).

*Results: The concentration profiles of spiked E2 and its byproduct E1 are illustrated in **Fig. 1**. When E2 was spiked, after running for 22 hours, the concentration of E2 dropped to 4.2, 7.4, 5.8, 5.3, and 8.8 µg/L for the sand layers of 0-2, 2-4, 6-8, 14-16, and 18-20 cm, representing a reduction of E2 by about 86%, 75%, 80%, 82%, and 72%, respectively. The decreasing trend of E2 continued after 46 hours even if its extent was getting less apparent. After 92 hours, E2 was completely disappeared. Following rapid E2 dissappearance at the initial stage, the transformed product of E1 increased and then decreased as E2 turned much lower. Once disappered, both E2 and E1 did not emerge again till the end of the runs that lasted for totally 142 hours. In **Fig. 2**, the estimated vertical distribution of the first-order degradation rate constant (k) for E2 is displayed. The estimated values of k for E2 with the biofilm of the top 20 cm sand layer fell in the range of 0.054-0.089 h^{-1}. The changes in the k values along the filter depth were probably caused by the changes in the microbial density attached on the filter media, as **Fig. 3** displayed.*
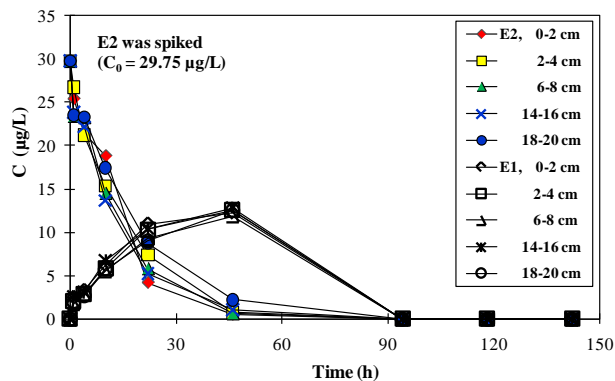
Fig. 1. *Concentration profiles of E2 (and its byproduct E1) in batch reactors with biofilm of five different sand layers.*
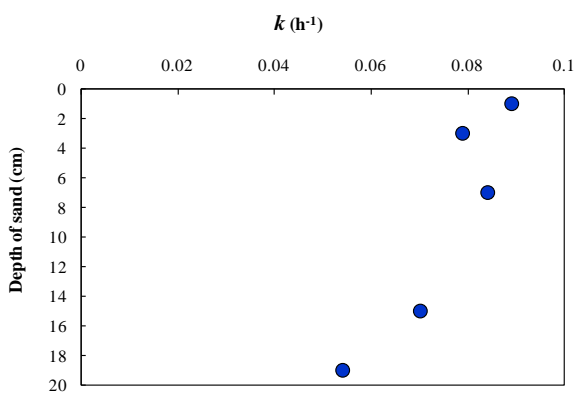
Fig. 2. *Changes of the apparent first-order degradation rate of E2 along the vertical direction of the sand filter Layer.*
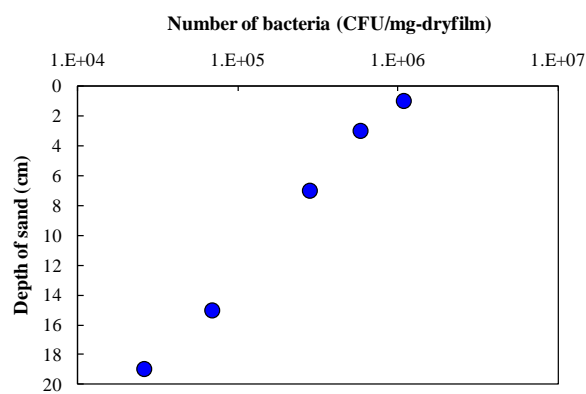
Fig.3. *Distribution of microbial density along the vertical direction of the sand filter.*

Keywords: 17β-estradiol (E2), slow sand filtration, biofilm

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Graham, N.J.D. (1988). Slow Sand Filtration: Recent Developments in Water Treatment Technology, Ellis Horwood Ltd., West Sussex, England.

o-Nitrophenol and 2,4-dinitrophenol Removal Activity
in the Rhizosphere of Giant Duckweed

Risky Ayu Kristanti[1), Masahiro Kambe[2), Tadashi Toyama[1), Yasuhiro Tanaka[1) and Kazuhiro Mori[1)

1) **Interdiscipline Graduate School, Medical & Engineering,Yamanashi University**
2) **Departement of Civil & Environment Engineering, Faculty of Engineering**

Yamanashi University

Email: g09dea06@yamanashi.ac.jp

Abstract. *Removal activity of 2 major nitrophenols, including o-nitrophenol and 2,4-dinitrophenol in the presence of giant duckweed (Spirodela polyrrhiza) were investigated. Two hydrophonic cultivation system (A and B) were conducted in 200 ml of river water supplemented with 10 mg/L of each nitrophenol. In test system A, 20 fronds of sterile giant duckweed were planted in the river water, whereas test B was made up of only river water. Control test containing sterile giant duckweed and sterile water was also investigated. Each system were repeatedly constructed in 2 cycles every 10 days. The concentration of o-nitrophenol and 2,4-dinitrophenol were periodically monitored by high performance liquid chromatography (HPLC). The results showed that giant duckweed accelerated removal activity of o-Nitrophenol and 2,4-Dinitrophenol in its rhizosphere (test A), whereas substrates persisted in the river water (test B). In control test, all nitrophenols were found to be persisted in the water, indicating accelerated removal activity were attributed by the presence of bacteria in its rhizosphere.*

Keywords : o-nitrophenol, 2,4-dinitrophenol, giant duckweed, removal, rhizosphere

Category: *Applied Sciences and Engineering*

Presentation Media: Oral Presentation

References:
[1] Badri, D.V. (2009). "Rhizosphere chemical dialogues: plant-microbe interactions". *Biotechnology,* 20, 1-9.
[2] Toyama, T. *et. al.* (2006). "Accelerated aromatic compounds degradation in aquatic environment by use of interaction between spirodela polyrrhiza and bacteria in its rhizosphere." *J. Biosci. Bioeng.*, 101(4), 346-353.

Degradation of Chrysene by Crude Enzyme Extracted

from *Polyporus* sp. S133

Tony Hadibarata[1), Risky Ayu Kristanti[2) and Sanro Tachibana[3)
1) **Faculty of Forestry, Mulawarman University, Indonesia**
2) **Interdiscipline Graduate School, Medical & Engineering,Yamanashi University**
3) **Faculty of Agriculture, Ehime University, Japan**

Email: g09dea06@yamanashi.ac.jp

Abstract. *Polyporus sp. S133, a fungus collected from soil, was selected for its ability to grow on and degrade chrysene as a sole carbon source. The effect of adding tween 80 and glucose oxidase (GOD) to increase degradation rate of chrysene was studied. Maximal degradation (86.1%) was obtained when Polyporus sp. S133 was incubated in a soil supplemented with 0.50% of tween 80. The chrysene degradation was also found to be higher with the addition of GOD. The mechanism for degradation of chrysene with the fungus through identification of the intermediates was found. Several enzymes (manganese peroxidase, laccase and 1,2-dioxygenase) produced by Polyporus sp. S133 were detected in the culture. The highest enzyme activity was shown by laccase after 20 days of cultivation (32.2 Ug^{-1}). These enzymes played an important role to oxidize chrysene.*

Keywords : degradation, chrysene

Category: *Applied Sciences and Engineering*

Presentation Media: Oral Presentation

References:
1) Hadibarata, T. *et. al*. (2007). "Biodegradation of chrysene by fungi screened from nature." *The proceeding of 57th the Ann. Meeting of the Japan Wood Res. Soc.*, Hiroshima, P. 59.
2) Arora, D.S. *et. al*. (2001). "Comparison of two assay procedures for lignin peroxidase." *Enzy. and Microb. Tech.*, 28, 602-605.

Cellular Automata for Micro Traffic Modeling and Simulation

Tri Harsono[1, 2], Kohei Arai[1]

[1] Information Science Department Saga University, Saga Japan

[2] Electronics Engineering Polytechnic Institute of Surabaya (EEPIS), Surabaya Indonesia

triharsono69@yahoo.com, arai@is.saga-u.ac.jp

Abstract. *Cellular automata is a method that is discrete in space, time, and state variables. Due to discreteness, cellular automata is extremely efficient in implementation on a computer. Cellular automata for traffic have been called by traffic cellular automata (TCA). One kind of TCA is Nagel-Schreckenberg TCA, it is more commonly known as the stochastic traffic cellular automata (STCA). Based on STCA, we modified it by add driver behaviors into the car-following model on the micro traffic. The driver behaviors are agent and diligent driver. We implemented it on the case of vehicle evacuation from disaster occurred area. The experimental simulation results found the evacuation time in the effective way. The following explanation describes STCA, and then modified STCA will be expressed. Furthermore experimental simulation results are stated and followed by together with some discussions and conclusions.*

STCA by using lane changing [1][2] have the rule as follows: (1)Acceleration $v_{(i,j)}(t-1) < v_{\max} \wedge gs_{(i,j)}(t-1) > v_{(i,j)}(t-1)+1 \Rightarrow v_{(i,j)}(t) \leftarrow v_{(i,j)}(t-1)+1$;(2)Braking $gs_{(i,j)}(t-1) \leq v_{(i,j)}(t) \Rightarrow v_{(i,j)}(t) \leftarrow gs_{(i,j)}(t-1)-1$; (3) Randomization $\xi(t) < p \Rightarrow v_{(i,j)}(t) \leftarrow \max[0, v_{(i,j)}(t)-1]$; (4) Vehicle movement $x_{(i,j)}(t) \leftarrow x_{(i,j)}(t-1) + v_{(i,j)}(t)$; (5) Lane changing: Determine probability of lane changing P_{lc} and a = [0 : v] for: $gs_{(i=1,j)}(t-1) < v \wedge x_{(i=2,j,j+v)}(t-1)=0 \Rightarrow x_{(i=2,j+a)}(t) \leftarrow x_{(i=1,j)}(t-1)$ or $gs_{(i=2,j)}(t-1) < v \wedge x_{(i=1,j,j+v)}(t-1)=0 \Rightarrow x_{(i=1,j+a)}(t) \leftarrow x_{(i=2,j)}(t-1)$; (6) Car following/vehicle movement: Back to step (4).

Based on [3], a modified STCA considering agent driver and diligent driver is presented as follows:

(1) Acceleration $v_{(i,j)}(t-1) < v_{\max} \wedge gs_{(i,j)}(t-1) > v_{(i,j)}(t-1)+1 \Rightarrow v_{(i,j)}(t) \leftarrow v_{(i,j)}(t-1)+1$; (2) Braking $gs_{(i,j)}(t-1) \leq v_{(i,j)}(t) \Rightarrow v_{(i,j)}(t) \leftarrow gs_{(i,j)}(t-1)-1$; (3) randomization: $\xi(t) < p \Rightarrow v_{(i,j)}(t) \leftarrow \max[0, v_{(i,j)}(t)-1]$;

(4) vehicle movement: if a diligent driver, $x_{(i,j)}(t) \leftarrow x_{(i,j)}(t-1) + v_{(i,j)}(t) + [0 : \min(\bar{v},v]$, else if an agent driver, $x_{(i,j)}(t) \leftarrow x_{(i,j)}(t-1) + v_{(i,j)}(t) + [0 : \max(v)]$; (5) lane-changing: if $gs_{(i=1,j)}(t-1) < v$ and $x_{(i=2,j,j+v)}(t-1)=0$, $x_{(i=2,j+a)}(t) \leftarrow x_{(i=1,j)}(t-1)$, and if $gs_{(i=2,j)}(t-1) < v$ and $x_{(i=1,j,j+v)}(t-1)=0$, $x_{(i=1,j+a)}(t) \leftarrow x_{(i=2,j)}(t-1)$, where probability of lane changing P_{lc} and a = [0 : v]; (6) Car following /vehicle movement: Back to step (4).

Figure 1(a) shows that when the diligent driver is increase, both the evacuation time in the modified STCA model and the STCA model is decrease. We found that it is lower in the modified STCA model than that in the STCA model. These conditions occur not only in the agent = 1 but also in the agent = 2 and 3. As the number of agent increasing, the evacuation time will be decrease.

Figure 1(b) describes comparison the effect of mean speed between previous model and modified STCA model. As the mean speed increasing, the evacuation time will be decrease not only in the STCA model but also in the modified STCA model. We note that the evacuation time in the modified STCA model is lower than that in the STCA model when the mean speed is increase. For the agent increasing, we got the evacuation time in the modified STCA model is decrease. It provides a leap of evacuation time from mean speed = 1 to mean speed = 2. It has 44% decreasing in the STCA model and 47% in the modified STCA model.
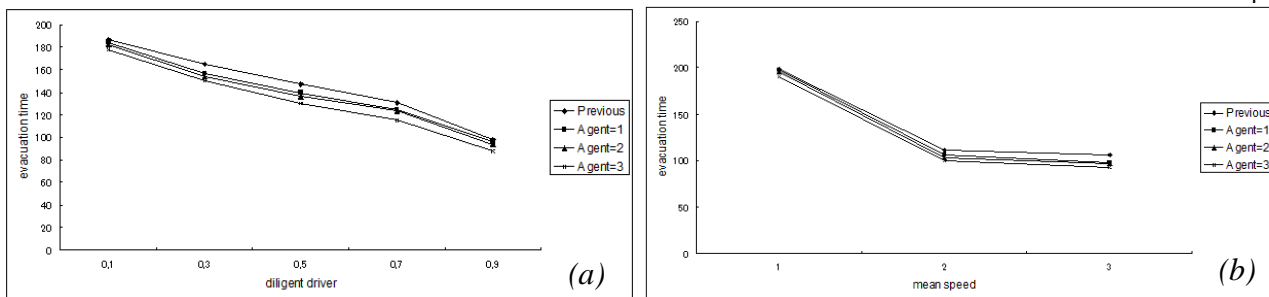
Fig. 1. Effect of Car-following model in the previous model: STCA model and modified STCA model based on (a) diligent driver, (b) mean speed. The density k = 0.6, lane-changing = 0.
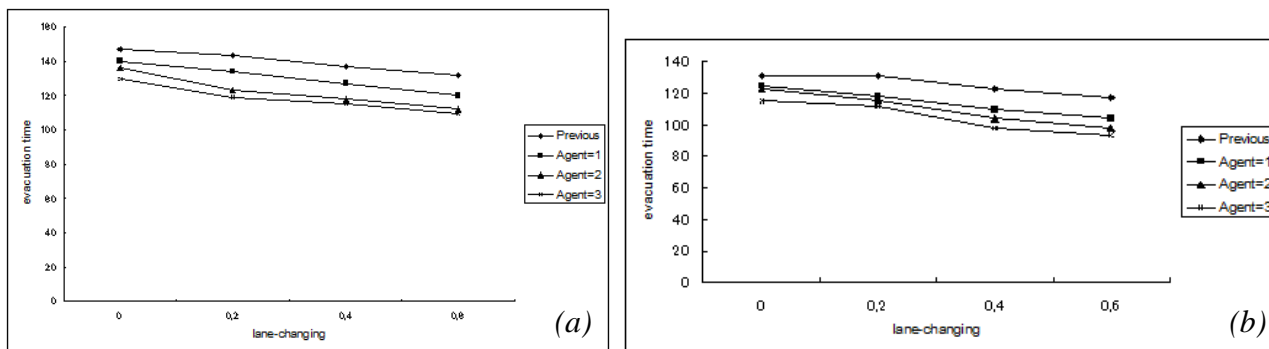
Fig. 2. Effect of car-following model in the previous model: STCA model and modified STCA model based on lane-changing. The density k = 0.6. (a) diligent driver = 0.5; (b) diligent driver = 0.7.

Figure 2, we get the evacuation time in the modified STCA model is lower than that in the STCA model. As lane-changing increasing, evacuation time will be decrease not only in the modified STCA model but also in the previous model. We also note that the evacuation time is more decrease when the number of agent is larger, and also by the lane-changing increasing, it will be found the evacuation time decrease.

The comparative simulation study between STCA model and modified STCA model is conducted. In the modified STCA model, the effect of diligent driver, lane-changing, and mean speed towards the evacuation time are larger than that in the STCA model.

Keywords: Cellular automata, micro traffic, agent, diligent driver, evacuation time.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Nagel, K. & Schreckenberg, M. (1992). A cellular automaton model for freeway traffic. *Journal Physics I France*, Vol. 2, No. 12, (December 1992) 2221-2229, 1155-4304.

[2] Maerivoet, S. & De Moor, B. (2005). Cellular automata models of road traffic. *Physics Reports*, Vol. 419, Issue 1, (November 2005) 1-64, 0370-1573.

[3] Kretz, T. (2007). Pedestrian Traffic, Simulation and Experiment. PhD Thesis, Vom Fachbereich Physik der Duisburg-Essen University.

Microencapsulation of *d*-Limonene as Flavor and Medium-chain Triglycerides Oil by the Modified Starch

Vita Paramita

Department of Chemistry and Biotechnology, Graduate School of Engineering, Tottori University

Jurusan Teknik Kimia, Fakultas Teknik, Universitas Diponegoro

Email address: vita.paramita@gmail.com

Abstract. *Microencapsulation of flavors and oils in carrier matrices is a great importance in the flavor and food industries. It is a process which small particles or core materials are packaged by a wall material to form microcapsules [1]. d-Limonene, a volatile compound, was applied as the model flavor mixed with medium-chain triglycerides (MCT). MCT are non-volatile of edible oils consisting of C8 and C10 saturated fatty acids. It was microencapsulated because of its benefits for the rapid energy production without storage of fat in the body. It was the first applied for dietary treatment of malabsorption syndromes caused by rapid absorption [2]. Process and storage stability of powder containing foods can be increased by chemical modification of starches. Its starch is produced by esterification of starch and anhydrous octenylsuccinic acid under alkaline conditions and called as octenyl-succinate starch (OSA starch) [3]. Volatile compound easily vapor during storage. Therefore, MCT was applied for protecting the flavor and increased the value of encapsulated MCT using modified starch. In this study, effect of the ratio of d-limonene and microencapsulated MCT by modified starch on the physicochemical characteristics of microencapsulated powder was investigated. The ratio of d-limonene and MCT was set at 1:9. The modified starch for wall material was Capsul. The solid content, which consists of wall material, flavor and oil, was set at 40 wt%. The mixing solution was homogenized by a Polytron homogenizer (PT-6100, Kinematica, Littau, Switzerland) at 8000 rpm for a total time of 3 min with a 30 s interval between every 1 min of homogenization for producing the emulsion. The microcapsules were produced by feeding the emulsion and employing Ohkawara-L8 spray dryer equipped with a centrifugal atomizer. The feed flow rate was 30 ml/min at various temperatures, the atomizer speed 30,000 rpm, the air flow rates 110 kg/h, the inlet air temperatures 160 ºC, and the outlet air temperatures were in the range of 101-106 ºC. The flavor retention and surface oil of d-limonene were analyzed by gas chromatography; the surface oil of MCT was analyzed by thin liquid chromatography. The structural microspheres of spray-dried powders were observed by a Scanning Electron Microscope for internal and external structure. The structural powder after surface oil measurement was also observed. The increasing of the ratio of MCT to the d-limonene increased the surface oil of MCT and decreased the surface oil of d-limonene. However, the lowest of total surface oil was investigated on the ratio of 1:1 of MCT to the d-limonene. Higher ratio of d-limonene or MCT increased the total surface oil. The external morphologies confirmed a spherical powder with the cavity on their surfaces. By applying only d-limonene on the powder, the flavor embedded on the surface structure can be seen easily, and after washing by hexane, the small hole on the surface showed clearer. This condition gave opinion that without MCT the d-limonene was not properly encapsulated on the surface. However, d-limonene was well entrapped on the wall region, shown by the higher flavor retention of d-limonene investigated on the powder without MCT, comparing to the powder with MCT. The MCT affected the surface oil and flavor retention of encapsulated d-limonene powder.*

Keywords: Microencapsulation, MCT oil, *d*-limonene, surface oil

Category: *Applied Sciences/Engineering*

Presentation Media: *Oral Presentation*

References

[1] Jafari, S.M., Assadpoor, E., Bhandari, B., and He, Y. (2008). "Nano-particle encapsulation of fish oil by spray drying." *Food Res. Int.*, 41, 172-183.

[2] Toyosaki, T., Sakane, Y., and Kasai, M. (2008). "Oxidative stability, *trans,trans*-2,4-decadienals, and tocopherol contents during storage of dough fried in soybean oil with added medium-chain triacylglycerols (MCT)." *Food Res. Int.*, 41, 318-324.

[3] Tesch, S., Gerhards, Ch., and Schubert, H. "Stabilization of emulsions by OSA starches." *J. Food Eng.*, 54, 167-174.

The Possibility of the Application of Double-skin Façade in Indonesia

Rosady Mulyadi[1]

[1] Div. of Architectural & Environmental Design, Dept. of Environmental Engineering & Architecture, Grad. School of Environmental Studies, Nagoya University, Furo-cho, Chikusa-ku, Nagoya, 464-8601

Email address: mulyadi.rosady@h.mbox.nagoya-u.ac.jp; rosady@unhas.ac.id

Abstract. *This paper presents the performance of double-skin façade in reducing the skin load of building façade. In heating climate like Indonesia, skin load of building façade is mostly by thermal transmittance and solar heat gain. Therefore, by the application of double-skin facade, it is expected that thermal transmittance and solar heat gain can be decreased significantly. Practically, double-skin facade is a façade construction of building envelope, which comprises of two transparent covering surfaces (glass wall) as an exterior and interior glass wall aside by air cavity as a channel for airflow exchange, shading device (blind), top and bottom ventilation. The cavity's function is a thermal buffer for the indoor air temperature [1][2]. Since solar radiation received in outer skin, the air in the cavity gradually warmed. Then, by the buoyancy principle, the warm air drove outside the cavity through the air outlet at the top of double-skin facade [3][4]. Furthermore, this research conducted by using numerical simulation. A FORTRAN source code had been developed and verified by measured data from Izumi Campus Media Building of Meiji University located in Tokyo. Data required to perform the simulation are: design parameter; building operational parameter; and weather data based on Indonesia's condition. Models of double-skin façade with various glass thickness, skin distances, and orientations were tested. Moreover, the simulation results show that the thickness of the outer and inner glass skins plays an important role in reducing solar heat gain: as the thickness of the glass skins is increased, solar heat gain decreases. On the other hand, the distance between the outer and inner glass of the double-skin facade controls thermal transmittance: as the distance between the glass skins is increased, thermal transmittance becomes lower. All is shows that the application of double-skin facade in Indonesia is available in any building orientation (for north, east, south, and west cases). In addition, an analysis for the possibility of condensation to occur at the outer surface of the inner glass had been done and it was found that during the building operation time (08:00-17:00), there is no condensation appears on the inner glass skin of double-skin facade. Temperature of outer surface of inner glass of double-skin facade was nearly the same with outdoor temperature in the morning and afternoon. However, at that time, temperature of outer surface of inner glass of double-skin facade was not reach saturated point, since there was approximately more than 1°C temperature difference to dew point temperature. Normally, condensation will occurs when the temperature of surrounding air is lower to its dew point. However, since simulation time was limited to the building operation time, and also there is a tendency of the temperature of outer surface of inner glass to become decrease during the time, there is a possibility of condensation to occur at night time. This matter should be investigated in the future. After all, in comparison to the single-skin façade, double-skin facade is better than single-skin facade in reducing skin load. In this case, more than 50% of skin load can be reduced by double-skin facade compared to single-skin facade. In single-skin, approximately 80% of skin load is by solar radiation and 20% by thermal transmittance. This is different from skin load value in double-skin facade. In double-skin façade, solar heat gain value due to its orientation is approximately 80% is caused by thermal transmittance and about 20% is by solar heat gain. But overall, total skin load in double-skin facade is lower than single-skin façade window system. All those results are showing that DSF is applicable and be more beneficial for equator area where solar radiation is abundant like Indonesia.*

Keywords: double-skin façade, single-skin façade, thermal transmittance, solar heat gain, condensation

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

Journals

[1] Jiru, T.E. and Haghighat, F. (2008). "Modeling Ventilated Double Skin Facade—A Zonal Approach." *Energy and Buildings,* 40, 1567–1576.

[2] Zhou, J. and Chen, Y. (2010). "A review on applying ventilated double-skin facade term to buildings in hot-summer and cold-winter zone in China." *Renewable and Sustainable Energy Reviews,* 14(4), 1321-1328.

[3] Wong, P.C., Prasad, D., and Behnia, M. (2008). "A new type of double-skin facade configuration for the hot and humid climate." *Energy and Buildings,* 40(10), 1941–1945.

Internet Sources:

[4] Poirazis, H. (2004). "Double Skin Façades for Office Buildings: Literature Review". http://www.ebd.lth.se/fileadmin/energi_byggnadsdesign/images/Publikationer/Bok-EBD-R3-G5_alt_2_Harris.pdf (Accessed at July 1, 2010)

Visualization of Two-phase Flow Distribution in A Distributor Inside Vertical and Horizontal Tubes

Azridjal Aziz[2,3], Akio Miyara[1], Koutaro Tsubaki[1] and Tomoaki Shigetomi[2]

[1]Department of Mechanical Engineering, Saga University, 1 Honjomachi, Saga-shi, 840-8502, Japan

[2]Graduate School of Science and Engineering, Saga University

[3]Department of Mechanical Engineering, Riau University, Pekanbaru, 28293, Indonesia

Email address: azridjal@yahoo.com

Abstract. *This paper presents a study of two-phase flow distribution inside vertical and horizontal tubes distributor using air and water as the working fluid. The use of small tube diameter to enhance a performance of heat exchangers, will cause a large pressure drop of refrigerant flow, also leads to increase in heat transfer performance [2]. Therefore, to reduce the pressure drop of the refrigerant flow and to achieve proper distribution from multiple numbers of parallel refrigerant passages, the liquid portion of the two-phase flow must be divided equally to each evaporator coil circuit using a distributor.*

In this study, experimental research is aimed to analyze flow regime of air-water two phase flows through the distributor. The flow regimes are observed by visualization using a high speed camera and volumetric flow rates of air and water were measured for each upper outlet and lower outlet branches of distributor. Effect of the distributor in horizontal and vertical position was especially investigated.

The schematic diagram of experimental apparatus used in this study has shown in Fig. 1. The experimental apparatus consists of air and water supply system, merging section, a distributor test section, gas-liquid separator, air measuring bath, and water measuring cylinder. The test section consists of an entrance tube with diameter of 8 mm and tube length 400 mm from section of the distributor inlet to ensure a fully developed flow and a distributor with one inlet and two outlet tube. The distributor made from transparent acrylic to conduct the flow visualization observation.
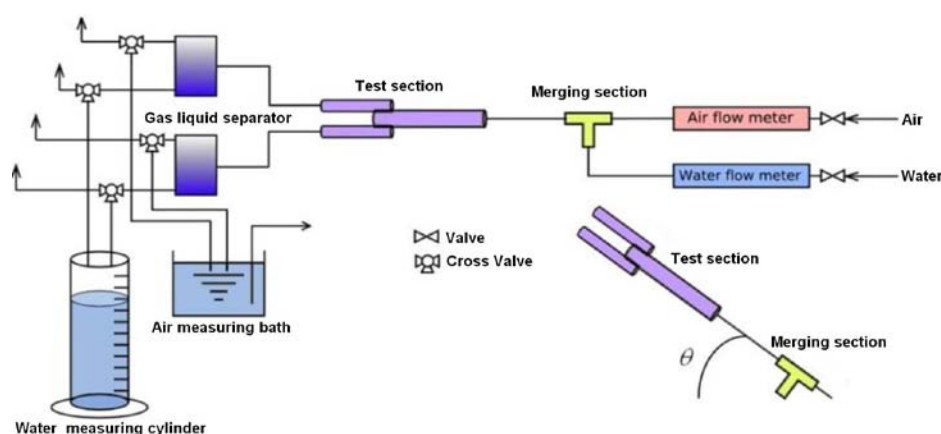
Fig. 1 Schematic diagram of experimental apparatus

The experimental conditions are set in different position of the distributor at 0° and 90° to investigate the effect of distributor position to two phase flow distribution with varying air and water volumetric flow. The inclination angle 0° degree is used for horizontal position and 90° degree is used for vertical position. The measurements at each exit of distributor were taken after

the air and water flowing out through gas-liquid separator using air measuring bath and water measuring cylinder.

The data presented for air phase and water phase is in superficial velocity number. Data used in this experimental conditions for the air superficial velocity is 0.37, 0.69, 1.62, 3.46, 4.43 [m/s] and for the water superficial velocity is 0.03, 0.17, 0.31, 0.83, 3.71 [m/s]. The flow pattern map of Mandhane-Baker[3-4] for concurrent flow in horizontal pipe and Sekoguchi[5] for concurrent flow in vertical pipe are used for analysis flow distribution regime. The black circle mark for 0° and triangle mark for 90 ° angle. In these conditions the flow regime after entrance of distributor are slug flow, slug flow with bubble, dispersed flow, stratified flow, bubble flow, wave flow and annular flow.

(a)   *(b)*
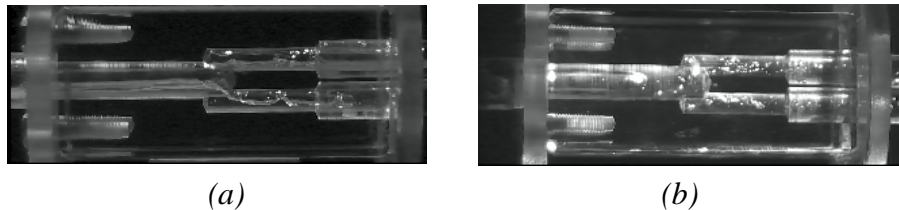
Fig.2 Visualized image at U_G = 1.45 m/s and U_L = 0.18 m/s as slug flow at horizontal position (a) and U_G = 1.62 m/s and U_L = 0.17 m/s as slug flow with bubble at vertical position (b)

The distribution of two-phase flow through distributor tends evenly flow distribution on the vertical position and tends unevenly distribution on horizontal position. At vertical position or 90°, the flow distribution tends evenly distributed from various experimental conditions. The separated flow will occurs at low water superficial velocity and high air superficial velocity (stratified flow, wave flow and annular flow). The mixed flow will occurs at high water superficial velocity and low air superficial velocity (bubble flow, dispersed flow, annular flow). The water tends to flow out at the lower outlet, and air tends to flow out at the upper outlet of the tube branches because of gravity. It was difficult to assign the same velocity at difference distributor position.

Keywords: *Two-phase flow, Distributor, Visualization, Vertical, Flow regime.*

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] A. Marchitto, F. Devia, M. Fossa, G. Guglielmini and C. Schenone, "Experiments on two-phase flow distribution inside parallel channels of compact heat exchangers", International Journal of Multiphase Flow, pp 128-144, Vol. 34 (2008).

[2] S. Yoshioka, H. Kim and K. Kazai,"Performance Evaluation and Optimization of A Refrigerant Distributor for Air Conditioner", Journal of Thermal Science and Technology, pp 68 – 77, Vol. 3, No. 1 (2008),.

[3] J.M. Mandhane, G.A. Gregory and K. Aziz, "A flow pattern map for gas-liquid flow in horizontal pipes", pp 537-553, International Journal of Multiphase Flow, 1, (1974).

[4] O. Baker, "Design of pipe lines for simultaneous flow of oil and gas", Oil and Gas Journal, 26 July (1954), pp 185-195.

[5] T. Ueda, Two-Phase Flow (in Japanese), Yokendo Co, Ltd, (1989).

Preparation of $(BiS)_{1.2}(Mg_xTi_{1-x}S_2)_2$ Misfit Layered Compound as Novel Thermoelectric Materials

Yulia Eka Putri, Ning Wang, Yifeng Wang, Chunlei Wan, Nam Hee Park and

Kunihito Koumoto.

Graduate School of Engineering, Nagoya University, Nagoya 464-8603, Japan

yulia.putri@f.mbox.nagoya-u.ac.jp

Abstract. Thermoelectric materials can convert thermal energy into electric energy by utilizing the Seebeck effect, so that they can harvest electric energy from waste heat and renewable energy. Thermoelectric materials are evaluated by dimensionless figure of merit ($ZT = S^2\sigma T/\kappa$) where S, σ and κ are Seebeck coefficient, electrical conductivity and thermal conductivity, respectively, at a given absolute temperature, T [1].

Titanium disulfide has a layer structure which is separated by Van der Waals gap. It is known to possess a large power factor (S^2/ρ) but its high thermal conductivity limits its TE performance demonstrating a rather low ZT value at room temperature [1]. In order to increase the ZT value, thermal conductivity must be reduced without degrading the high power factor. One of the method is intercalation of Bismuth Sulfide (BiS) into the Van der Walls gap forming the so-called misfit layer compound [2]. These did reduce the thermal conductivity but increased electrical conductivity too much because electron transfer occurred from BiS to TiS_2 layers enhancing the carrier concentration. As the result, the Seebeck coefficient and power factor decreased [3]. We are now trying to combine two methods, i.e. intercalation of BiS into Van der Waals gap and substitution of Magnesium into Ti site forming the $(BiS)_{1.2}(Mg_xTi_{1-x}S_2)_2$ compound. Substitution of Magnesium (Mg^{+2}) into Titanium (Ti^{+4}) sites was attempted to decrease the carrier concentration and hence increase the power factor, resulting in a possible increase in the ZT value as a whole.

The samples were prepared by a solid state reaction method. Elementary titanium (99.9 wt %), magnesium (99.5 wt %), bismuth (99.95 wt %) and sulfur (99 wt %) were mixed and sealed in an evacuated silica tube and fired at 800 ^{o}C for 3 days. The bulk samples were then treated by spark plasma sintering (SPS) at 715 ^{o}C.

The XRD patterns indicate of both intercalation of BiS into the Van der Waals layer and substitution of Mg^{+2} into Ti sites [2]. These are also supported by the increasing of the value of lattice parameter c from 5.7032 Å for TiS_2, 16.9641 Å for BiS $(TiS_2)_2$ to 16.9854 Å for $(BiS)_{1.2}(Mg_{0.05}Ti_{0.95}S_2)_2$. Figure 1 are FE-SEM images of $(BiS)_{1.2}(Mg_{0.05}Ti_{0.95}S_2)_2$ sample before and after SPS. Figure 1 (a) shows the shape is plate-like and figure 1 (b) shows the pressing process by SPS is not optimal to fabricate the bulk specimen with preferential orientation. The preferential orientation is needed to determine in-plane (parallel) and cross-plane (perpendicular) direction of misfit layered compound.
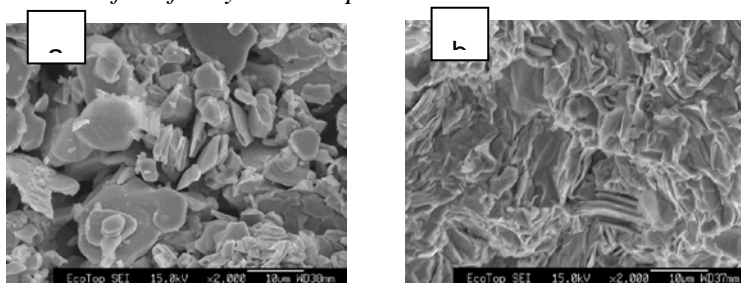
Figure 1. *FE-SEM observation of misfit layered compound.*

(a). Before SPS; (b). After SPS.

The substitution of Mg into Ti sites did reduce the carrier concentration at room temperature from 5.2×10^{21} cm^{-3} to 2.14×10^{21} cm^{-3} and hall mobility from 3.2 $cm^2/v.s$ to 3.00 $cm^2/v.s$. Figure 2 shows that electrical conductivity decreased due to the decreasing of carrier concentration. Seebeck coefficient and power factor decreased slightly. The negative value of Seebeck coefficient shows that the charge carriers are electrons. Thermal diffusivity increased due the acoustic velocity [4].
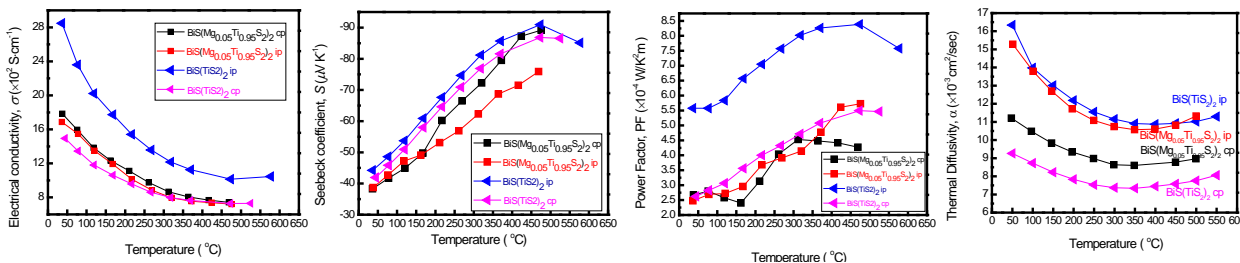
Figure 2. Electrical and thermal properties of $(BiS)_{1.2}(Mg_{0.05}Ti_{0.95}S_2)_2$.

The arrangement of particles in a textured manner with preferential orientation, probably might change the properties of samples. It can be optimized during the SPS process by increasing the pressure.

Keywords: Thermoelectric, figure of merit, Seebeck coefficient, misfit layered.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References:
[1] H. Imai, Y. Shimakawa, Y. Kubo, *Phsical Review B.* **64** (2001) 241104 (R).
[2] C. Barriga, P. Lavela, J. Morales and J.L. Tirado, *Solid Sate Ionics,* **63-65** (1993) 450-456.
[3] Chunlei Wan, Yifeng Wang, Ning Wang and Kunihito Koumoto, *Materials,* **3** (2010) 2606-2617.
[4] X.Y. Qin, J. Zhang, D. Li, H.Z. Dong, *J.of Applied Physics*, **102** (2007) 073703.

Electrical and Crystalline Properties of Pr_2O_3 as Attractive Material in CMOS Technology

Kusumandari[1,2], M. Sakashita[2], O. Nakatsuka[2], and S. Zaima[2]

[1]Physics Department, Faculty of Mathematics and Natural Sciences, Sebelas Maret University, Surakarta, Indonesia

[2]Graduate School of Engineering, Nagoya University, Japan

kusuma@alice.xtal.nagoya-u.ac.jp

Abstract. *Miniaturization in CMOS industry has thinned the SiO2 gate dielectric layer to less than 2 nm in thickness. But electron tunneling is a major concern at this level as it contributes to current leakage through the gate. Further, it would increase the already problematic gate current leakage (Ig) and lead to power loss, increased power consumption and generate excess heat [1-3]. Therefore, new material are needed to replace SiO2.*

High –k material, Pr_2O_3, is one of candidate as gate dielectric layer due to the high value of dielectric constant (~30). In this study, we investigated electrical and crystalline properties of Pr_2O_3. After chemical cleaning of a Si (001) substrate, Si/Pr_2O_3 structure was prepared by atomic layer deposition (ALD) method using $Pr(EtCp)_3$ as praseodymium source and H_2O as oxygen source. Figure 1 shows current image at substrate voltage (Vs) -1 volt observed by using conducting atomic force microspcopy (C-AFM). Leakage spots was observed and average current density was increased by substrate voltage (figure 2). Figure 3 shows the crystalline morphology of Pr2O3 conducting by transmission electron microscopy (TEM). Thickness of Pr_2O_3 was about 3 nm.

Keywords: CMOS, Si/Pr_2O_3 structure, leakage current, crystalline morphology

Category: *Applied Sciences and Engineering*

Presentation media: Oral Presentation

References:
Journals:
[1] G.D. Wilk, R.M. Wallace, J.M. Anthony, (2001), J. Appl. Phys. **89**, 5243
[2] R. Chau, S. Datta, M. Doczy, J. Kavalieros, and M.etz, (2003), Extended Abstracts of International Workshop on Gate Insulator 124-126.
[3] R. Chau, (2004), Advanced Metal Gate/High-k Dielectric Stacks for High-Performance CMOS Transistor, AVS Fifth International Conference on Microelectronics and Interfaces (ICMI'04) Santa Clara, CA, USA.
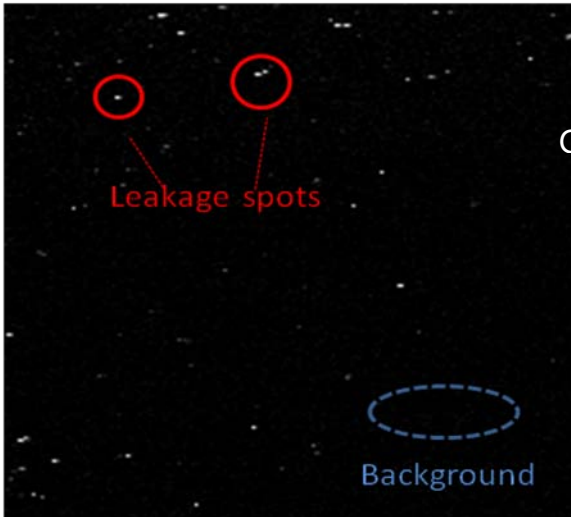
Fig. 1. Current image at -1 volt
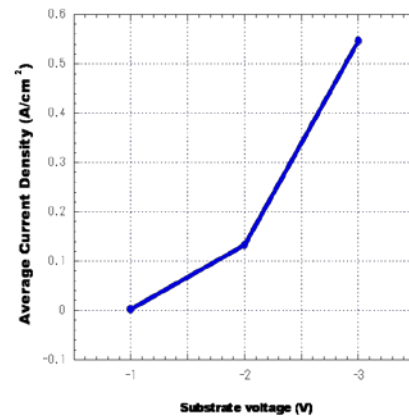
Fig.2 Average current density increase by substrate voltage
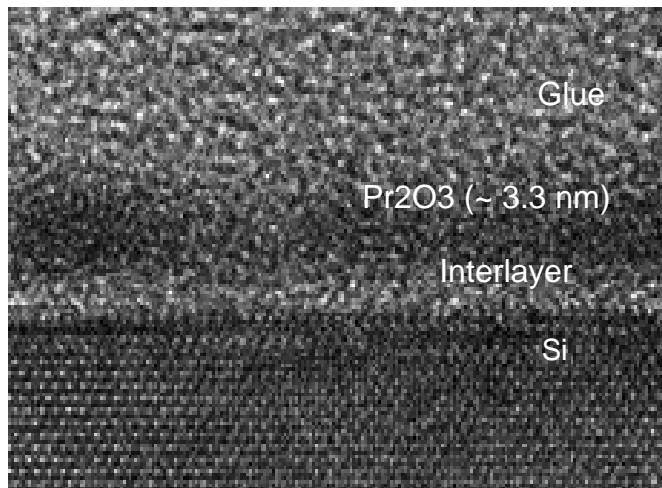
Fig.3 TEM image of Pr2O3

An Overview of Speech Recognition Research for Indonesian Language

Dessi Puji Lestari[1], Sadaoki Furui[2]

Department of Computer Science, Graduate School of Information Science and Engineering,

Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8552 Japan

[1]Email address:dessi@furui.cs.titech.ac.jp

[2]Email address:furui@cs.titech.ac.jp

Abstract. *A speech recognition system (ASR) is generally constructed by a set of technologies that allows a computer to transform sound input recorded through a microphone to a sequence of words. State of the art speech recognition technologies use statistical methods. It requires a large scale speech and text corpus to train their acoustic and language models. Researches on ASR have been extensively conducted for many languages, including English, Japanese, and Chinese. It also has already been integrated to many kinds of applications, such as voice-control applications, dictation, and telephone solutions. For Indonesian languages, there have been significant research activities on ASR in recent years. This paper presents some of the speech recognition-related works for Indonesian languages. Due to difficulties of finding a large scale corpus for both speech and text, in early works on Indonesian ASR which started in 2003, preliminary researches focused on phone recognition, isolated word recognition, and small vocabulary ASR [1]. Other researchers also tried to build a large vocabulary continuous speech recognition system (LVCSR) for Indonesian language using a rapid approach; they used a cross-language approach to build phoneme-based speech recognition [2]. Under the A-STAR Project, PT. Telkom Indonesia, in the collaboration with the ATR Japan, collected a large scale speech corpus and developed an Indonesian LVCSR system [3]. Their target applications were speech recognizers for hearing and speaking impaired people and automatic machine translation for Asian Languages using a spoken dialogue system. Different from their research, our researches are focusing on how to improve Indonesian LVCSR performance affected by the speech variation problem. It has been revealed that proper nouns and English words are the main sources of recognition errors. By using some model adaptation techniques, we have successfully improved the performance of the ASR [4]. Our target application is spoken query-based information retrieval. While previously mentioned researches are mainly conducted abroad (Japan), a research has also been conducted in an Indonesia University (UI) to develop an Indonesian LVCSR system [5]. Although there have been some good reports on the development of Indonesian ASR in recent years, many works still need to be conducted to make this technology applicable to our daily life. This includes LVCSR that is robust to the dialect problem. Since Indonesia has hundreds of local languages and dialects, the performance of the ASR might be decreased due to the dialect variations. Another research area is spontaneous speech recognition. Indonesian spontaneous speech has characteristics different from formal and read speech. Thus, this needs to be further investigated.*

Keywords: Indonesian Language, Automatic Speech Recognition (ASR), Large Vocabulary Continuous Speech Recognition System (LVCSR).

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References

[1] Indrayanti, L., Dutono, T., Nakagawa, A., Chisaki, Y., and Usagawa, T. (2003) "Preliminary Development of Indonesian LVCSR: Database Preparation and Acoustic Modelling for Isolated Word Recognition", *Proc. Joint Conference of Electrical and Electronics Engineers*, Kyushu, 12-1P-02.

[2] Sakti, A., Markov, K., and Nakamura, S. (2005). "Rapid Development of Initial Indonesia Phoneme-Based Speech Recognition Using Cross Language Approach", *O-COCOSDA*, Jakarta、Indonesia.

[3] Sakti, S., Kelana, E., Riza, H., Markov, K., and Nakamura, S. (2008). "Development of Indonesian Large Vocabulary Continuous Speech Recognition System within A-STAR Project", *Workshop on Technologies and Corpora for Asia-Pacific Speech Translation*, Hyderabad, India.

[4] Lestari, D.P., and Furui, S. (2010), "Adapatation to Pronunciation Variations in Indonesian Spoken Query-Based Information Retrieval", *IEICE Trans. Information and System*, Vol.E93-D, No.9. (To be published)

[5] Baskoro, S., and Adriani, M. (2008). "Developing an Indonesian Speech Recognition System". *Proc. 2nd International MALINDO Workshop*, Cyberjaya, Malaysia.

The Geodynamic and Earthquake Risk in West Java, Indonesia, Deduced from Geodetic and Seismic Data

Nuraini Rahma Hanifa[1,3], Takeshi Sagiya[1], Fumiaki Kimata[1], Cecep Subarya[2], Hasanuddin Z. Abidin[3], Irwan Meilano[3],

[1] **Research Center of Seismology, Volcanology and Hazard Mitigation Graduate School of Environmental Studies, Nagoya University, Japan**
[2] **National Coordinating Agency for Surveys and Mapping, Indonesia**
[3] **Geodesy Research Division, Institut Teknologi Bandung, Indonesia**

Corresponding email address: hanifa@seis.nagoya-u.ac.jp

Abstract. *The Australia plate is subducting beneath the Sunda plate at the Java trench, south of Java, Indonesia ,with the velocity increasing from 5.6 cm/year in the west to 6.9 cm/year in the east. It is considered that this subduction process is mainly aseismic, that is, plate coupling at the Java trench is weak and the relative plate motion is accommodated by steady slip at the plate boundary, based on seismological (Newcomb and McCann, 1989) as well as GPS studies (Bock et al. 2003, Simons et al., 2007). As result of the subduction, some faults exist in Java, mostly in the western part of Java island. Those studies dealt with a large scale features of seismotectonics in Java, and for example, detailed crustal strain distribution has not been revealed in Java.*
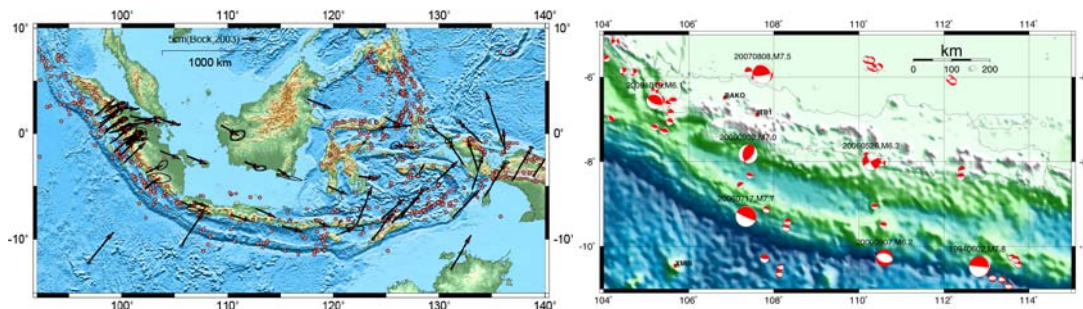
Figure. Left. Sunda Trench earthquake history. Red dot from USGS catalogue (1973-Oct 2009). GPS velocity from Bock (2003). Right. Java earthquake history. CMT data from USGS catalogue (1973-Oct 2009), with magnitude more than 6.

In the last 15 years, Two tsunami earthquake events occurred in the southern offshore of Java, in 1994 (M7.8) and 2006 (M7.7), respectively, caused about 600 casualties. Tsunami earthquake refer to a condition where the tsunami is much more destructive than the almost unfelt shaking of the earthquake (Ammon et al., 2006, Hanifa et al, 2006). In May 26, 2006, an inland earthquake of M6.3 occurred in Yogyakarta, occurred at shallow depth causing about 6000 casualties. Recently, in September 2, 2009, an earthquake occur in south coast of West Java, about 100 km in north of the 2006 earthquake. While the July 2006 earthquake was weakly felt by people in offshore, the 2009 earthquake was felt in almost all part of Java island, caused about 80 casualty and many destructions.

We definitely need deeper understanding of the mechanical processes along the Java trench to understand the seismotectonics in Java, the most populated island in Indonesia. Hence, The objectives of this study are to understand the current rate velocity of crustal deformation in Java from geodetic data and to understanding the subduction effect in Java.

Since 1998 until 2008, only 1 Continous IGS site operated in Java, namely BAKO. In the end of 2007, Bakosurtanal (National Coordinating Agency for Surveys and Mapping, Indonesia) has established several continuous GPS (CGPS) sites in Java. Available data in this study consist of 7 sites, from 5 January 2008 until 31 December 2009. ITB also establish 1 Continuously Operating Reference Stations (CORS) GPS site namely ITB1, available from 10 January 2008 - 31 December 2009 in this study.

In order to investigate detailed crustal strain distribution in west Java, we processed GPS phase data recorded at this 7 new GCPS sites in west Java and 7 IGS sites in the surrounding region to obtain precise daily coordinates. We use Bernese GPS software Version 5.0 with precise satellite orbit and earth rotation parameters provided by IGS (International GNSS Service). So far we have processed two years continuous data from January 2008 to December 2009.

To have more dense network, we added some GPS campaign conducted in West Java by Geodesy Group of ITB in period of 2006 until 2009 as reported by Hasanuddin et al (2009). We re-processed these campaign data using same processing strategy as the continuous sites.

The results of the horizontal components show some difference in western and eastern part of the network. The eastern part move to south-east direction, while the western part move to north-west direction To explain this different, we did some source mechanism modeling, and constrained with seismic data.

Our model suggest that the eastern part move to south-east direction, due to the post seismic of the Java 2006 Earthquake that is still continuing 3 years after the earthquake, with maximum slip of 3 cm, or 2.4 percent of the coseismic slip. The western part move to north-west direction due to coupling of the Australian plate subduction, as much as 30 percents. The fault location of this western part of java is consistent with the present of seismic gap in this area. An earthquake of 7.3 has occurred in this area in 1903, felt in west java until Jakarta, and Lampung area in South of Sumatera.

The result of our simple model suggest the importance to continue study and observation in this area, as well as to increase earthquake and tsunami knowledge and preparedness to the people living in this area.

Keywords. Java, Geodynamic, subduction, GPS.

This paper is in submission to Journal of Asian Earth Sciences.

Category: *Applied Sciences/Engineering*

Presentation Media: *Oral presentation*

References
[1] Ammon, C.J., Kanamori, H., Lay, T., Velasco, A.A. 2006. The 17 July 2006 Java tsunami earthquake. Geophys. Res. Lett., 33, L24308, doi:10.1029/2006GL028005.

[2] Bock et.al. (2003). *Crustal motion in Indonesia from Global Positioning System Measurements*. Journal of Geophysical Research, Vol. 108, No. B8, 2367.

[3] Hanifa, N.R., Irwan Meilano, Takeshi Sagiya, Fumiaki Kimata, Hasanuddin Z. Abidin. 2008a. Numerical Modeling of The 2006 Java Tsunami Earthquake. Advances in Geosciences

[4] Hasanuddin et al. 2009. Crustal Deformation Studies in Java (Indonesia) using GPS. Journal of Earthquake and Tsunami, Vol. 3, No. 2, p.77-88.

[5] Newcomb, K.R., and McCann, W.R. (1987*). Seismic History and Seismotectonics of the Sunda Arc*. Journal of Geophysical Research, Vol. 92, No. B1, pages 421-439, January 10, 1987.

Nitrogenase Active Center Oriented
Novel S4 – type electron-donating site of Iron Complex for Nitrogen Activation

Sunu Hadi Prabowo

Graduate School of Environmental Studies, Nagoya University

sunu.hadi.prabowo@mbox.nagoya-u.ac.jp

Abstract.

　窒素原子はアミノ酸、核酸などに含まれており、植物や動物のタンパク質の構成要素で、すべての生物に必須の元素である。また、燃料や肥料、医薬品などの窒素化合物にも必要不可欠な物質である。窒素は窒素分子(N_2)として空気成分の 78％を占め、豊富で入手しやすい元素でもある。しかし窒素分子は強い分子結合を持ち、分解しにくく、極めて安定であり、反応しにくいことが知られている。そのため、不活性である N_2 を利用するには、N_2 を 他の反応しやすい窒素化合物へと変換すとが必要となる。

　窒素分子の活性化のために注目するのはニトロゲナーゼという窒素の還元酵素である。この酵素は常温・常圧という穏和な条件で窒素分子をアンモニアへと還元している。単離に成功したニトロゲナーゼには FeMoco と呼ばれるクラスター構造が存在しており、窒素分子の還元部位であると考えられている。その構造は Fe 原子 7 個、S 原子 9 個、Mo 原子 1 個が存在する硫黄豊富な環境をしている。また、窒素の還元には 1 分子の窒素に対して少なくとも 8 つの電子が必要である。その電子はヒドロゲナーゼとフラボタンパク質の酸化還元により得られると考えられる。しかしながら、詳しい窒素の還元メカニズムは未だ解明されていない。そこで本研究ではこのニトロゲナーゼの活性部位を指向し、フェロセンを電子供与部位として用いる新規 S4 型鉄錯体を設計した。そして設計された錯体による窒素分子の活性化の検討およびニトロゲナーゼの還元メカニズムの解明を目的とした。

Keywords: nitrogen activation, food security, energy, sustainability.

Category: *Applied Sciences/Engineering*

Presentation Media: Oral Presentation

References
Books
[1] Jonas C. Peters and Mark P. Mehn. (2006). *Bio-organometallic approaches to nitrogen fixation chemistry. Activation of Small Molecules* 3: 81
[2] Goormachtig, S., W. Capoen, and M. Holsters. (2004) *Rhizobium* infection: lessons from the versatile nodulation behaviour of water-tolerant legumes. Trends in Plant Science **9**: 518-522
Journals
[3] Hoffman, B.M.; Dean, D.R.; Seefeldt, L.C. (2009) Climbing nitrogenase : toward a mechanism of enzymatic nitrogen fixation. *Acc. Chem. Res. 42*, 609-619.
[4] Sarah K. Russel et al. (2010) *Inorg. Chem.* Articles ASAP

Internet Sources:

[5] Stephen K. Ritter. *American Chemical Society : Chemical & Engineering News*, 2008, 86, 33. The Haber-Bosch Reaction: An Early Chemical Impact On Sustainability.

MEDICAL SCIENCE

Therapeutic Potential of Inflammatory Bowel Disease (IBD) by CD8$^+$CD122$^+$ Regulatory T cell

Agustina T Endharti [1,3,5], Nobuaki Misawa[2], Shinya Toyokuni[2], Masafumi Ito [4], Ken-ichi Isobe [1], Haruhiko Suzuki[1]

[1] [1]Department of Immunology, Nagoya University Graduate School of Medicine, Nagoya, Japan

[2]Department of Pathology, Nagoya University Graduate School of Medicine, Nagoya, Japan

[3]Japanese Society for Promotion of Science, Tokyo, Japan

[4]Department of Pathology, Japanese Red Cross, Nagoya Daiichi Hospital, Nagoya, Japan

[5]Faculty of Medicine, Brawijaya University, East-Java, Indonesia.

tinapermana@yahoo.com

Abstract. *We identified CD8$^+$CD122$^+$ regulatory T cells and demonstrated their importance in the maintenance of immune homeostasis and in the recovery from experimental autoimmune encephalomyelitis (EAE). However, the role of CD8$^+$CD122$^+$ regulatory T cells in other diseases is unknown. Here we show that CD8$^+$CD122$^+$ regulatory T cells effectively prevent and cure inflammatory bowel disease (IBD) in a mouse model. In our experiments, IBD was induced in lymphocyte-deficient RAG-2$^{-/-}$ mice by transferring CD4$^+$CD45RB^{high} cells that were excluded with CD4$^+$ Treg. CD8$^+$CD122$^+$ cells showed a suppressive effect when they were transferred 4 weeks after transfer of CD4$^+$CD45RB^{high} cells. At that moment, symptoms of IBD had already appeared. Co-transfer of CD8$^+$CD122$^+$ cells clearly suppressed the development of IBD and this suppressive effect of CD8$^+$CD122$^+$ cells was similar to that of CD4$^+$CD45RB^{low} cells that mostly contained CD4$^+$ Treg. CD8$^+$CD122$^+$ cells obtained from IL-10$^{-/-}$ mice showed insufficient suppressive activity for IBD, indicating IL-10 as an important effect-transmitting factor in the suppression of the development of IBD indicating the therapeutic potential of CD8$^+$CD122$^+$ cells. These overall findings demonstrate the potential role of CD8$^+$ regulatory T cells, possibly together with CD4$^+$ Treg, in the medical care of IBD patients.*

Keywords: inflammatory bowel disease, colitis, regulatory T cells, CD8+CD122+.

Category: *Medical Sciences*

Presentation Media: Oral Presentation

References

[1] Endharti AT, Shi Z, Fukuoka, Y., Nakahara,Y., Kawamoto, Y., Takeda, K and Suzuki, H. 2005. Cutting edge: CD8$^+$CD122$^+$ regulatory T cells produce IL-10 to suppress IFN-γ production and proliferation of CD8$^+$ T cells. *J Immunol*., **175**, 7093-7.

[2] Foussat A, Cottrez F, Brun V, *et al*. 2003.A comparative study between T regulatory type 1 and CD4$^+$CD25$^+$ T cells in the control of inflammation1. *J Immunol*;**171**:5018–26.

[3] Huibregtse IL, van Lent, AU, van Deventer SJ. 2007. Immunopathogenesis of IBD: insufficient suppressor function in the gut? *Gut*., **56**, 584–92.

[4] Pomié C, Ménager-Marcq I, van Meerwijk JP. 2008. Murine CD8$^+$ regulatory T lymphocytes: the new era. *Hum Immunol*., **69**, 708-14.

[5] Sakaguchi S, Yamaguchi T, Nomura T, *et al*. 2008. Regulatory T cells and immune tolerance. *Cell*., **133**, 775-87.

Monitoring Early Network Oscillations in Developing Amygdala Neuron with Calcium Imaging Technique

Sara Wardhani[1], Yuji Ikegaya[2]

[1] Lab. Chemical Pharmacology, Graduate School Pharmacology, Tokyo University, Tokyo, Japan

Research Center for Advanced Science and Technology, Graduate School of Engineering, Tokyo University, Tokyo, Japan [2]

Email address: swardhani@gmail.com

Abstract. *Monitoring neuronal activity in the real time can gives more information and understandable about how the brain actually works. Here we describe the advancements of imaging systems which monitors the firing activity of more than a thousand neurons through their somatic calcium signals. Functional Multineuron Calcium Imaging (fMCI) bridges the study in neuronal network activity to single cell resolution. Using fMCI, we found that the amygdala neuron in early development contain an oscillator which the intrinsic cellular properties, its clinical and physiological function will be important to be exclusively investigated in future.*

Keywords: Early Network Oscillations, Amygdala, fMCI

Category: *Medical Sciences, Natural Sciences*

Presentation Media: Oral Presentation

References

Journals

[1] Shigehiro Namiki and Yuji Ikegaya (2009) "Current Application and Technology of Functional Multineuron Calcium Imaging" *Biol.Pharm.Bull.32* (1)1-9

[2] Sara Wardhani, Shigehiro Namiki, Takuya Sasaki, Norio Matsuki, Yuji Ikegaya. (2010) "Early Network Oscillation in Amygdala Neuron" (in press).

Internet Sources:

[3] Sara Wardhani, Shigehiro Namiki, Norio Matsuki, Yuji Ikegaya. (2010) "Early Network Oscillation in Amygdala Neuron" Proceeding in Society for Neuroscience conference 2009, Chicago, USA.

The Inhibitory Effect of GLP-1 Analog (liraglutide) on High Glucose-induced Oxidative Stress in Kidney of Streptozotocin-induced Type 1 Diabetic Rats

Hari Hendarto[1,2], Toyoshi Inoguchi[1,3], Yasutaka Maeda[1], Noriyuki Sonoda[1,3]

Kunihisa Kobayashi[1], Ryoichi Takayanagi[1]

[1] Department of Medicine and Regulatory Science, Faculty of Medical Sciences, Kyushu University

[2] Faculty of Medicine and Health Sciences, Syarif Hidayatullah State Islamic University Jakarta

[3] Innovation Center for Medical Redox Navigation, Kyushu University

Email address : harihendarto@yahoo.com

Abstract. *Objective: Oxidative stress may be a major cause for the development of diabetic nephropathy. Here we show the direct beneficial of glucagon-like peptide-1 (GLP-1) analog, liraglutide, on oxidative stress and renal dysfunction in streptozotocin-induced diabetic rats, type 1 diabetic models.*

Research Design and Methods : Streptozotocin-induced type 1 diabetic male wister rats were randomized for 4 weeks receiving 0,3 mg/kg liraglutide twice daily subcutaneously. We evaluated oxidative stress markers, expression of NAD(P)H oxidases, and albuminuria.

Results : Administration of liraglutide did not affect plasma glucose levels in diabetic rats, while it reduced blood pressure levels slightly. There was significant decrease in body weights in rat that were treated with liraglutide, while liraglutide reduced daily food intake only in non-diabetic rat. Liraglutide administration was also associated with a significant decrease of total 8-Hydroxy-2'-Deoxyguanosine and total 24 hours micro albumin excretion rate in urine samples, compared with non liraglutide group. Expression of renal NAD(P)H oxidase components (NOX4, gp91phox/Nox2, p22phox, p47phox), expression of renal TGF-beta and fibronectin were significantly increased in diabetic rats. Insitu detection of superoxide by glomerular immunostaining also showed that an increase of superoxide production in streptozotocin group was ameliorated by GLP-1.

Conclusion : The present study suggested that liraglutide may have direct beneficial effect on diabetic nephropathy via amelioration of enhanced oxidative stress in diabetic kidneys.

Keywords: GLP-1 analog, liraglutide, NAD(P)H oxidase, oxidative stress, diabetic nephropathy.

Category: *Medical Sciences*

Presentation Media: Oral Presentation

References

Journals

[1] Inoguchi T, Sonta T, Tsubouchi H, Etoh T, Kakimoto M, Sonoda N, Sato N, Sekiguchi N, Kobayashi K, Sumimoto H, Utsumi H, Nawata H. (2003). "Protein kinase C-dependent increase in reactive oxygen species (ROS) production in vascular tissues of diabetes: role of vascular NAD(P)H oxidase." *J. Am. Soc. Nephrol.,* 14, S227-S232.

[2] Etoh T, Inoguchi T, Kakimoto M, Sonoda N, Kobayashi K, Kuroda J, Sumimoto H, Nawata H. (2003). "Increased expression of NAD(P)H oxidase subunits, NOX4 and p22phox, in the kidney of streptozotocin-induced diabetic rats and its reversibity by interventive insulin treatment." *Diabetologia*., 46(10)**,** 1428-1437.

[3] Sonta T, Inoguchi T, Tsubouchi H, Sekiguchi N, Kobayashi K, Matsumoto S, Utsumi H, Nawata H. (2004). "Evidence for contribution of vascular NAD(P)H oxidase to increased oxidative stress in animal models of diabetes and obesity." *Free Radic. Biol. Med.*, 37**,** 115–123.

Metode Noninvasif untuk Kuantifikasi Frekuensi Denyut Sel *Pacemaker* Derivat dari Sel Punca Embrional dengan Videomikroskop *Time-lapse*

Udin Bahrudin

***Division of Regenerative Medicine and Therapeutics, Tottori University Graduate School of Medical Sciences, Japan*; Bagian Jantung dan Kedokteran Vaskuler, Fakultas Kedokteran Universitas Diponegoro, Indonesia**

Email: bahrudin00@gmail.com

Abstrak. <u>Latar belakang</u>: *Penciptaan biopacemaker jantung merupakan salah satu aplikasi sel punca untuk pengobatan penyakit. Sel pacemaker yang diisolasi dari sel punca embrional yang telah dideferensiasi harus memiliki karekeristik fisiologis sebagaimana dimiliki oleh sel pacemaker sebagai pemicu siklus kontraksi-relaksasi jantung. Metode patch-clamp yang merupakan standar analisis elektrofisiologis sel pacemaker [1] memiliki beberapa keterbatasan, yaitu sulit mempertahankan suhu sel pada kisaran suhu fisiologis ($37^{o}C$) pada saat pemeriksaan berlangsung, risiko sel pecah disebabkan oleh pipet kapiler gelas yang tajam dan berakibat pada keterbatasan jumlah pemeriksaan (intervensi) pada sel yang sama. Videomikroskop time-lapse [2] adalah tehnik noninvasif yang memungkinkan untuk memeriksa denyut sel yang berada dalam kondisi suhu fisiologis di dalam bilik inkubator sel. <u>Tujuan</u>: Untuk memeriksa frekuensi denyutan sel pacemaker jantung derivat dari sel punca embrional dan responnya terhadap beberapa macam obat. <u>Metode</u>: Sel pacemaker jantung dipisahkan dari sel punca embrional tikus yang telah dideferensiasi dengan cara sebagaimana dilaporkan sebelumnya [3]. Sel yang berdenyut diinkubasi di dalam bilik inkubator sel yang dihubungkan dengan dengan sistem kamera monitor terkomputerisasi. Gambar real-time direkam dan disimpan dalam memori komputer. Analisis time-lapse dikerjakan dengan perangkat lunak Metamorf. <u>Hasil</u>: Rekaman time-lapse menunjukkan sel pacemaker (in vitro) berdenyut secara teratur dan stabil dengan frekuensi mendekati frekuensi denyut jantung tikus in vivo. Azelnidipin (senyawa penyekat kanal kalsium tipe L) mengurangi frekuensi denyut sel pacemaker sesuai dengan dosisnya (dose dependent manner). Efek serupa juga ditemukan pada sel pacemaker yang diinkubasi pada medium yang mengandung penyekat reseptor ryanodine (Ryanodine). Temuan terpenting dari penilitian ini adalah pemeriksaan videomikroskop time-lapse dapat diulang pada sel yang sama, meskipun pada hari yang berbeda, baik tanpa obat maupun dengan pengaruh obat-obatan yang sifatnya reversible, tanpa memberikan pengaruh signifikan terhadap perubahan frekuensi denyut sel pacemaker. Hal yang disebutkan terakhir ini tidak memungkinkan dikerjakan dengan metode patch-clamp. <u>Simpulan</u>: Videomikroskop time-lapse dapat digunakan untuk mengukur kuantitas denyut sel pacemaker derivat dari sel punca embrional dalam keadaan suhu fisiologis in vitro. Metode noninvasif ini dapat diaplikasikan untuk melengkapi metode patch-clamp yang merupakan standar analisis elektrofisiologi sel pacemaker jantung dan sekaligus menutupi kekurangannya.*

Kata kunci: Sel pacemaker jantung, sel punca embrional, vidoemikroskop *time-lapse*, frekuensi denyut sel jantung.

Kategori: *Medical Sciences*

Media Pustaka: *Oral Presentation*

Pustaka

[1] Petersen, O.H. (1992). "Ion channels. Ten years of patch-clamp studies." *Biochem. Pharmacol.* 43(1), 1-3.

[2] Kamgoué, A., Ohayon, J., Usson, Y., Riou, L., and Tracqui, P. (2009). "Quantification of cardiomyocyte contraction based on image correlation analysis." *Cytometry A*. 75(4), 298-308.

[3] Morikawa, K., Bahrudin, U., Miake, J., Igawa, O., Kurata, Y., Nakayama, Y., Shirayoshi, Y., and Hisatome, I. (2010). "Identification, isolation and characterization of HCN4-positive pacemaking cells derived from murine embryonic stem cells during cardiac differentiation." *Pacing. Clin. Electrophysiol*. 33(3), 290-303.

Karakteristik Transkripsi Gen-gen Pengkode Protein Pengatur Kalsium pada Sel Punca Embrional selama Proses Diferensiasi menjadi Sel Jantung

Udin Bahrudin

Division of Regenerative Medicine and Therapeutics, Tottori University Graduate School of Medical Sciences, Japan; **Bagian Jantung dan Kedokteran Vaskuler, Fakultas Kedokteran Universitas Diponegoro, Indonesia**

Email: bahrudin00@gmail.com

Abstrak. *Latar belakang: Sel punca embrional tikus memiliki kapasitas untuk berdeferensiasi menjadi sel jantung melalui pembentukan agregat sel yang menyerupai badan embrio (embryonic body) [1]. Usaha untuk membuat biopacemaker dari sel punca embrional terhambat dengan beberapa masalah yang belum terpecahkan, yaitu belum ditemukannya garis keturunan sel (cell lineages) yang tepat, penanda sel, dan adanya potensi terjadinya keganasan. Baru-baru ini, kami telah melaporkan bahwa identifikasi dan isolasi sel pacemaker jantung yang berasal sel punca embrional dapat dilakukan dengan menggunakan metode transfeksi permanen (stable tranfection) gen HCN4p-EGFP (HCN4 promoter‑enhance green fluorescent protein) [2]. Meskipun demikian, kondisi ideal sel pacemaker jantung sebagai bahan pembentuk biopacemaker masih belum diketahui dengan lengkap. Ciri khas yang paling menonjol dari sel pacemaker adalah sifat automatisitas dimana kalsium berperan penting di dalamnya. Tujuan: Untuk mengetahui karakteristik transkripsi gen-gen pengkode protein pengatur kalsium yang terekspresi selama proses diferensiasi sel punca embrional menjadi sel otot jantung. Metode: Sel punca embrional HCN4p-EGFP dibuat dengan metode homologous recombination untuk memasukkan rantai basa nukleotida EGFP pada lokasi gen HCN4 sel punca embrional AB1. Kultur dan diferensiasi sel dilakukan seperti yang telah dikerjakan sebelumnya [2]. RNA diekstraksi dari badan embrio pada hari ke-0, 7, 10, 15, dan 21 diferensiasi. Ekspresi mRNA diperiksa dengan metode reverse transcriptase-polymerase chain reaction (RT-PCR). Hasil: Konsisten dengan data yang telah dilaporkan sebelumnya [2], denyut awal badan embrio yang berasal dari sel punca embrional HCN4p-EGFP terjadi pada hari ke-6 sampai 7, dan presentase badan embrio yang berdenyut mencapai 90% pada hari ke-11. Sinyal GFP yang tidak tampak pada sel pluripoten (tidak berdeferensiasi) dapat terdeteksi pada daerah berdenyut badan embrio sel punca embrional HCN4-EGFP yang berdiferensiasi menjadi sel jantung. Intensitas maksimal sinyal GFP terlihat pada hari ke-13 sampai 14 diferensiasi. Transkripsi gen-gen pengkode protein pengatur kalsium (mRNA) yang terekspresi sejak fase awal diferensiasi adalah Inositol 1,4,5-triphosphate receptor 1 (IP3R$_1$), Sarcoplasmic/endoplasmic reticulum calsium ATPase 2 (Serca$_2$), Calreticulin, Calcineurin, Calmodulin 2, Calmodulin binding transcription activator 2 (Camta$_2$), dan Calcium/calmodulin-dependent protein kinase 2 (Camka$_2$); sedangkan yang terekspresi mulai fase pertengahan awal (hari ke-10) adalah Na$_+$/Ca$_{2+}$ exchanger 1 (Ncx1), serta yang terekspresi mulai fase pertengahan akhir (hari ke-15) adalah Triadin, Calsequestrin 2, dan Phospholamban. Data ini menunjukkan bahwa aliran kalsium dalam sel pacemaker jantung mungkin telah dimulai pada fase awal fase diferensiasi dengan terkespresinya IP3R$_1$, Calsequestrin dan Calmodulin, tetapi calcium induce calcium release (CICR) baru dimulai pada fase pertengahan awal diferensiasi, dan akhirnya lengkap pada fase akhir diferensiasi dengan terekspresinya Triadin, Calsequestrin, dan Phospolamban. Simpulan: Transkripsi gen-gen pengkode protein pengatur kalsium terekspresi secara bertahap selama proses diferensiasi sel punca embrional menjadi sel otot jantung, dan mencapai tahap sempurna pada tahap akhir diferensiasi. Hasil ini menunjukkan bahwa protein pengatur kalsium dalam sel punca embrional yang berdiferensiasi berperan pada proses diferensiasi dan maturasi menjadi sel otot jantung.*

Kata kunci: Sel punca embrional, transkripsi gen pengkode protein pengatur kalsium, diferensiasi menjadi sel jantung.

Kategori: *Medical Sciences*

Media Presentation: *Oral Presentation*

Daftar Pustaka

[1] Yanagi, K., Takano, M., Narazaki, G., Uosaki, H., Hoshino, T., Ishii, T., Misaki, T., *et al*. (2007). "Hyperpolarization-activated cyclic nucleotide-gated channels and T-type calcium channels confer automaticity of embryonic stem cell-derived cardiomyocytes." *Stem Cells*. 25, 2712-2719.

[2] Morikawa, K., Bahrudin, U., Miake, J., Igawa, O., Kurata, Y., Nakayama, Y., Shirayoshi, Y., and Hisatome, I. (2010). "Identification, isolation and characterization of HCN4-positive pacemaking cells derived from murine embryonic stem cells during cardiac differentiation." *Pacing. Clin. Electrophysiol*. 33(3), 290-303.

Role of Peroxisome Proliferator-activated Receptor alpha (PPARα) in Peroxisome Proliferators-induced Liver Injury

Doni Hikmat Ramdhan[1], Tamie Nakajima[1]

[1]Department of Occupational and Environmental Health, Nagoya University Graduate School of Medicine, Japan

Email address: donihr_05@yahoo.com

Abstract. *Previous studies revealed that as peroxisome proliferator-activated receptor alpha (PPARα) ligands, peroxisome proliferators (PPs) exposure have been associated with liver injury. On the other hand, the activation of PPARα by PPs can inhibit pro-inflammatory nuclear factor kappa B (NF-κB) and enhance hepatic lipid turnover via the β-oxidation system which reduced lipid accumulation in liver. Therefore, we hypothesized that anti-inflammatory of PPARα is important for protection in PPs-induced hepatotoxicity itself. However, while the function of mouse PPARα in the liver is relatively well defined, the human PPARα function in response to these PPs is still poorly understood. **Objective:** To clarify the role of mouse and human PPARα in PPs-induced hepatic toxicity and steatosis. **Method**: Male wild-type (mPPARα), Pparα-null and humanized PPARα (hPPARα) mice on an Sv/129 background were exposed to such as chemicals. PPs-induced hepatic damage was assessed through biochemical and histopathological measurements. The protection role of PPARα in PPs-induced liver injury could be showed by sensitivity of liver damage in PPARα-null mice. **Results:** Our present study clearly demonstrated that PPARα might be important in protection of TRI-induced hepatotoxicity, especially lipid accumulation in mice as shown by the increase of liver triglyceride (TG) levels and the histopathological lipid droplets in PPARα-null and humanized PPARα mice but not in wild-type mice following PPs treatment. In contrast, neither mouse nor human PPARα appeared to be important in the AST and ALT elevation due to PPs because these transaminase activities were elevated by the same degree in three genotype groups. PPs-induced AST and ALT elevation might be related to the increase in p52 in all genotyped mice as already shown in the previous experiment, though in Pparα-null and hPPARα □mice, p65 was also elevated after PPs exposure. In addition to increase in NF κB p52 and/or p65 and 50, TNFα expression levels increased in PPARα -null mice after TRI exposure, however, dramatic inflammation in PPs-induced liver injury was not occurred. This might be due to induction of PPARγ mRNA levels that repress inflammation. **Conclusions:** PPARa may not be involved in the inflammation process. However, the function of human PPARα may be weak for protection of TRI-induced lipid accumulation in the liver, especially in the inhibition of TG synthesis.*

Keywords: Peroxisome proliferators, PPARα, Hepatotoxicity, Fatty acid β-oxidation, Steatosis

Category: *Medical Science*

Presentation Media: Oral Presentation

References

[1] Ramdhan DH, Kamijima M, Yamada N, Ito Y, Yanagiba Y, Nakamura D, Okamura A, Ichihara G, Aoyama T, Gonzalez FJ, Nakajima T. (2008). "Molecular mechanism of trichloroethylene-induced hepatotoxicity mediated by CYP2E1". *Toxicol Appl Pharmacol.* 231:300-307.

[2] Ramdhan DH, Kamijima M, Wang D, Naito H, Ito Y, Yanagiba Y, Hayashi Y, Tanaka N, Aoyama T, Gonzalez FJ, Nakajima T. (2010). "Differential Response to Trichloroethylene-Induced Hepatosteatosis in Wild-Type and PPARα-Humanized Mice". *Environ. Health Perspec. (accepted).*

[3] Nakagawa T, Ramdhan DH, Tanaka N, Naito H, Tamada H, Ito Y, Li Y, Hayashi Y, Yamagishi N, Yanagiba Y, Aoyama T, Gonzalez FJ, Nakajima T. "Ammonium perfluorooctanoate may induce Pathophysiologically Differential Hepatic Damage in Relation to the Function of Peroxisome Proliferator-activated Receptor α (PPARα) in Mice". *(in preparation).*

Senesensi Sel dan Peran p53 pada Kardiovaskular

Sulistiyati Bayu Utami[1]

[1] *Division of Regenerative Medicine and Therapeutics, Tottori University Graduate School of Medical Science,* **Japan; Bagian Jantung dan Kedokteran Vaskular, Fakultas Kedokteran**

Universitas Diponegoro Semarang Indonesia

Email: sulis_bayu@yahoo.com

Abstrak. *Review. Studi epidemiologi menunjukkan bahwa penuaan usia (aging) merupakan faktor risiko dominan dalam proses aterosklerosis. Beberapa analisis genetik menggunakan model hewan menunjukkan beberapa molekul yang berperan penting dalam proses menua, meliputi sistem perbaikan DNA (DNA-repair system), jalur penekan tumor (tumor suppressor pathway), sistem pemeliharaan telomere (telomere maintenance system), jalur insulin/Akt, dan jalur metabolik lainnya. Sebagian besar molekul yang mempengaruhi perubahan fenotip pada penuaan juga meregulasi senesensi sel, sehingga membuktikan hubungan kausatif antara senesensi sel dan penuaan sel. Sementara itu, beberapa studi menunjukkan bahwa p53 berperan dalam kelainan kardiovaskular dan metabolik, termasuk menginduksi terjadinya aterosklerosis, gagal jantung, dan diabetes. Kerusakan DNA menyebabkan kematian sel atau berhentinya siklus sel maupun berhentinya proses proliferasi yang normalnya berkesinambungan. Faktor-faktor reperfusi iskemia dan neurohumoral, meliputi katekolamin dan angiotensin II, dapat menginduksi kerusakan DNA dengan meningkatkan spesies oksigen reaktif. Kardiomiosit menunjukkan apoptosis atau senesensi sebagai respon kerusakan DNA, yang berakibat terjadinya gagal jantung. Pada review ini, menelaah mengenai senesensi sel dan peran p53 dalam menyebabkan berbagai kelainan kardiovaskular dan metabolik, seperti aterosklerosis, gagal jantung, dan diabetes.*

Kata Kunci: senesensi, p53, aterosklerosis, gagal jantung

Kategori: *Medical Sciences*

Media Presentasi: Oral Presentation

Pustaka

Journals

[1] *Lakatta E.G, and Levy D. (2003). "Arterial and cardiac aging: major shareholders in cardiovascular disease enterprises". Circulation. Japan 107: 139-146.*

[2] Vazquez A, Bond E.E., Levine A.J., et al. (2008). *"The genetics of the p53 pathway, apoptosis, and cancer therapy". Nat Rev Drug Discov .AS 7, 979-987.*

Efek Mutasi Gen Uromodulin (UMOD) pada
Familial Juvenile Hyperuricaemic Nephropathy (FJHN) terhadap Maturasi Protein Uromodulin

Sulistiyati Bayu Utami[1]

[1] *Division of Regenerative Medicine and Theurapeutics, Tottori University Graduate School of Medical Science, Japan*; Bagian Jantung dan Kedokteran Vaskular, Fakultas Kedokteran

Universitas Diponegoro Semarang Indonesia

Email: sulis_bayu@yahoo.com

Abstrak. Review. *Familial juvenile hyperuricaemic nephropathy (FJHN), sebuah kelainan autosomal dominan, disebabkan oleh mutasi gen uromodulin (UMOD), suatu gen yang mengkode protein uromodulin. Protein uromodulin merupakan protein dengan kait glikosilfosfatidilinositol yang diekspresikan pada loop Henle asenden segmen tebal dan merupakan protein terbanyak yang diekresikan melalui urin. FJHN sendiri menunjukkan gejala penurunan sekskresi protein uromodulin pada urin, baik dengan peningkatan ataupun penurunan uromodulin plasma, insufisiensi ginjal, nefritis tubulointerstisial, dan sebagian dengan hiperurisemia serta gout. Terdapat profil uromodulin plasma yang berbeda pada fenotip FJHN fase awal dan lanjut. Uromodulin terdiri atas tiga domain epidermal growth factor (EGF)-like, dan regio sistein yang meliputi delapan sistein dan sebuah zona pellucida (ZP). Mutasi UMOD umumnya misens, dan 62% melibatkan residu sistein, dimana menyebabkan kelainan pada misfolding protein. Suatu studi menunjukkan bahwa tidak terdapat perbedaan fenotip mencolok antara pasien dengan mutasi dan tanpa mutasi UMOD. Pada suatu studi in vitro, protein uromodulin terdeteksi pada medium sel yang ditransfeksi, sesuai dengan sifat protein ini yang merupakan protein yang disekresi. Ditemukan pula bahwa uromodulin mutan mengalami keterlambatan maturasi yang signifikan, retensi pada retikulum endoplasma (RE), dan berkurangnya ekspresi uromodulin protein di membran plasma. Pada review ini, menelaah mengenai mekanisme yang terjadi akibat mutasi gen Uromodulin pada fenotip FJHN, meliputi gangguan maturasi dan trafficking intrasel.*

Kata Kunci: *FJHN*, uromodulin, gen UMOD

Kategori: *Medical Sciences*

Media Presentasi: Oral Presentation

Pustaka

Journals

[1] Sian E.W., Anita A.C.R., Juris G, Corinne A, Tim G, Fiona E.K, et al. (2009). "Uromodulin mutations causing familial juvenile hyperuricaemic nephropathy lead to protein maturation defects and retention in the endoplasmic reticulum." *Human Molecular Genetics,* AS 18(16), 2963–2974.
[2] Paul J, Sonia A, Peter K, Judith l, Karl l, Sian W, et al. (2007). "Membrane targeting and secretion of mutant uromodulin in familial juvenile hyperuricemic nephropathy." *J Am Soc Nephrol*, AS 18, 264-273.

Peran *Sphingolipid* dalam Perkembangan Terapi Kanker

Lusi Oka Wardhani

Division of Clinical Laboratory Medicine, Tottori University Graduate School of Medical Sciences, Japan;
Bagian Patologi Klinik, Fakultas Kedokteran Universitas Sebelas Maret, Indonesia

Email: lusioka@gmail.com

Abstrak. *Sphingolipid termasuk di dalamnya ceramide dan sphingosine merupakan komponen penting yang menyusun membran sel, yang memiliki fungsi penting dalam pengaturan proliferasi sel, daya tahan hidup sel /survival, dan proses kematian sel. Pemaparan sel dengan kemoterapi, radioterapi, heat stress, pengaktifan death receptors akan meningkatkan kadar ceramide yang akan dilanjutkan dengan sintesis ceramide de novo, katabolisme sphingomyelin, atau keduanya. Ceramide dimetabolisme dengan proses glikosilasi, asilasi, atau dengan katabolisme sphingosine yang kemudian difosforilasi menghasilkan sphingosine 1-phosphate (S1P) yang bersifat anti-apostosis. S1P berkompetisi dengan ceramide (sebagai penginduksi kematian sel) dengan memblokade terbentuknya ceramide dan downstream pathway. Keseimbangan dalam interaksi antara S1P dan ceramide akan mengatur kematian sel dan daya tahan hidup atau pertumbuhan sel. Pengaturan enzim dalam metabolisme ceramide, seperti sphingomyelin synthase (SMS) dan glucosylceramide synthase (GCS) merupakan kunci penting dalam mengontrol sinyal ceramide. Dalam penanganan kanker, munculnya resistensi terhadap obat kemoterapi merupakan suatu komplikasi yang dramatis. Beberapa sel kanker mengalami resistensi terhadap obat sitostatika, bertahan hidup, dan membentuk resistensi terhadap obat-obat kemoterapi yang diberikan. Multi-dug resistance (MDR) berkaitan dengan metabolisme sphingolipid, dengan memanipulasi metabolisme ini merupakan suatu cara untuk menghindarkan sel kanker mengalami sensitisasi terhadap kemoterapi. Strategi yang digunakan yaitu dengan mengarahkan metabolisme sphingolipid menuju produksi ceramide (pro-apoptosis) sehingga memicu kematian sel, dan dijauhkan dari metabolisme yang menghasilkan S1P dan GCS, dan merubah ekspresi atau aktivitas multidrug efflux pumps yang juga berperan dalam terjadinya MDR. Munculnya resistensi terhadap obat kemoterapi, maka dikembangkan pendekatan penanganan kanker dengan manipulasi secara farmakologis pada metabolisme sphingolipid untuk meningkatkan ceramide pada sel kanker.*

Kata kunci: Sphingomyeli; ceramide; sphingosine 1-phosphate; sphingomyelin synthase; glucosylceramide synthase.

Kategori: *Medical Sciences*

Media Presentasi: Oral Presentation

Pustaka

[1] Reynolds, C.P, Maurer, B.J., Kolesnick, R.N., (2004). "Ceramide synthesis and metabolism as a target for cancer therapy." *Elsevier. Cancer Letters*. 206, 169-

[2] Hannun, Y.A., Obeid, L.M., (2008). "Principles of bioactive lipid signaling: lesson from sphingolipids." *Nature Reviews. Molecular Cell Biology*. 9, 139-149

[3] Okazaki, T. (2006). "Section 2: Metabolizing enzymes such as sphingomyelin synthase induce cell death by increasing ceramide content." *Sphingolipid Biology*, Springer, Japan, 2.69-2.81.

[4] Meer, G.v., Egmond, M., Halter, D. (2006*).* "Section 4: Sphingolipids and multidrug resistance of cancer cells." *Sphingolipid Biology*, Springer, Japan, 4.263-4.270.

AGRICULTURE SCIENCE

Analytical Approach of Plate Sinkage Test

Lenny Saulia[1], Nobutaka Ito[2], Peng Chen[3], Koji Kito[3]

[1] Faculty of Agricultural Machinery and Biosystems, Bogor Agricultural University, Kampus IPB Darmaga PO Box 220, Bogor 16000, Indonesia

[2] Faculty of Engineering, Mie University, 1577 Kurima-machiya cho, Tsu city, Mie Pref., Japan 514-8507

[3] Faculty of Bioresources, Mie University, 1577 Kurima-machiya cho, Tsu city, Mie Pref., Japan 514-8507

Email address: lsaulia@gmail.com

Abstract. *The problems on the pressure-sinkage relationship related to soil properties and off-road (agricultural) vehicles' parameters (load, dimension of contact area) were not perfectly resolved for the design of running gear of off-road (agricultural) vehicles. Developed empirical models[1] overly generalized the effect of the shape contact ratio on sinkage for various soils. While the circumference and characteristic dimension of the loading plate may govern the pressure-sinkage relationship in soil[2].*

A sinkage prediction model was developed through analytical approach of soil deformation under loading plate. The evaluation with the experimental results was conducted to validate the model. The experiment was carried out in laboratory using a precise measurement system for the pressure-sinkage test. PERFORMER MK2 manipulator generated compression on a steel plate with penetration rate 0.47 mm/s which caused the steel plate sink into the medium. The data acquisition system was able to receive the measured signals of force and sinking depth. Two sets of steel plate with contact area 350 mm^2 and 250 mm^2 respectively were utilized. Each set consists of seven plates with different dimension based on the shape contact ratio ranged from 1 to 7.

The results of pressure-sinkage test using presice measurement system indicated the differences between sinkage observed and prediction using developed pressure-sinkage model. Model verification by plotting the predicted values against the observed data show that most of the plotted points were located within area of 95% confidence limit. It can be concluded that there is no significant difference between predicted and experimental result.

Keywords: Plate sinkage test, off-road (agricultural) vehicles

Category: *Agriculture Science*

Presentation Media: Oral Presentation

References

[1] Wong, J.Y. (2001). *Theory of Ground Vehicles*. 3rd ed. John Wiley & Sons, New York.

[2] Saulia, L., N. Ito, K. Kito, Wang X. L.n, and Ho J. (2007). "Investigation of Effect of Shape Contact ratio on Sinkage for Tracked Vehicles using New Measurement System". *WSEAS Trans. on Applied and Theoretical Mechanics* 1(2), ISSN: 1991-8747, 16-23

Hired Labor Arrangements for Farming Operations:
Case Study in a Wet Rice Village of Rural Java

Subejo[1]

[1] Dept. of Agricultural and Resources Economic, The University of Tokyo-Japan

and Faculty of Agriculture Gadjah Mada University, Yogyakarta-Indonesia

Email address: Subejo1972@yahoo.com

Abstract. *Labor sources in farming commonly have been supplied by family, exchange and hired labor. During the period of high labor demand, labors can be pursued through exchange and hired laborers. However due to the process of modernization and agricultural commercialization, practices of labor exchange and hired labor in farming area has been considerably changing.*

Study is focused on arrangement and structure of hired labor for farming operations and factors which determining households in arrangement of hired labor. Field research was conducted in 2009 covering two hamlets in rice field area namely Planggok and Somokaton in northwest Yogyakarta. Data were collected using direct interview, focus group discussions (FGDs), and analysis of documentation. In each hamlet, 30 farming households were interviewed. In Addition, twelve persons of working group leaders and or farming operators have also been interviewed.

The most common function of hiring labor in farming comprises land preparation-tractor, transplanting and harvesting-threshing. Those activities require a huge or collective labor, arduous tasks and should be completed in short time. However, a considerable number of households also used hired labor for wider activities such as weeding and hoeing-leveling. Bawon system is still also considerably practiced among villagers. Those hired labor activities commonly were performed under casual or regular labor contract and no case of seasonal or permanent labor contract.

Farming operations except for harvesting and threshing, the influential significant factor in determining of hiring labor is involvement on non-farming jobs, while farming operation for harvesting and threshing has been significantly influenced by whole of three factors comprising including cultivated land, income level and involvement on non-farming jobs.

The moral economy to some extent is still alive which has been indicated by bawon-bawon and bawon-operator arrangement for harvesting and threshing. Harvesting-threshing which done by tebasan-operator, it is likely the domain of households which characterized by large cultivable land, lower income and involved more on temporary and permanent jobs. Lower income seemingly urges households to sell standing paddy crops to tebasan contractor in order to get cash soon when crops close to the maturity. Even though they involved on on-farming jobs, but the jobs unlikely secure enough reliable income for household which it is related to the jobs types.

Price of hired labor under piece rate with team and skilled labor is higher than other contracts. The piecework wage and skilled labor contract allow farmers to pay laborers according to the labors' productivity. By comparing with wage rate for off-farm jobs, the wage rate of tractor service under skilled hired labor system and transplanting labor under piece rate with team is comparably higher than wage rate of laborer on off-farm jobs. However, in general, wage rate on off-farm jobs has been better as compared to the others hired labor on farming operations.

Households who hold status as both of employers and employees have lower income comparing with households who act only as employers. Operators have higher education and capital for running the business. While group leaders for transplanting have lower education and no capital but have high skill and social network. Harvesting contractors have large capital and wider social network in order to support smooth business covering wider area beyond village level.

The farming households still prefer to hiring labors from neighboring fellows including neighbors and or relatives which those often overlapping. Close social relationship is consedrably perceived important by villager on labor contract arrangements. To some extent, economic rationality and moral economy have been coexisting in hired labor arrangements for various farming operations in wet rice village of rural Java. However, the moral economy perception among villagers has been more limited.

Keywords: hired labor, rice, farming, rural, Java

Category: *Agriculture Science*

Presentation Media: Oral Presentation

References

[1] Henn, M. *et.al.*, (2006). *A Short Introduction to Social Research*, Sage Publications, London.

[2] Kikuchi, M. (1980). *Class Differentiation, Labor Employment, and Income Distribution in A West Java Village*, The Developing Economies, 18(1), 45-64.

[3] Naylor, R. (1990). *Rural labor market in Indonesia*, in Pearson, S (ed), Indonesian Rice Policy, Cornell Press.

[4] Roumassets, J. (2004). *Rural institution, agricultural development and pro-poor economic growth*, Asian Journal of Agriculture and Development, 1(1), 56-75.

[5] Subejo and Matsumoto, T., (2009). *Transformation of labor exchange arrangements in an agrarian community of rural Java, Indonesia*, J. Applied Sci., 9(22), 3932-3946.

Effects of Ce and Methanol on Growth and Expression of Methanol Dehydrogenase of *Bradyrhizobium japonicum* USDA110 and Its Enzymatic Properties

N. Kurniawati[1], M. Matsunaga[2], A. Pertiwiningrum[3], T. Iwama[2], and K. Kawai[2]

[1]**Graduate School of Applied Biological Sciences, Gifu Univiversity,1-1 Yanagido, Gifu 501-1193, Japan; [2]Faculty of Applied Biological Sciences, Gifu Univiversity, 1-1 Yanagido, Gifu 501-1193, Japan; [3]Faculty of Animal Sicience, Gadjah Mada University, Jl. Fauna No. 3, Yogyakarta, Indonesia.**

Email address: kawaik@gifu-u.ac.jp

Abstract. *Rare earth elements (REEs) have been widely used in high-technology products such as computers, mobile telephones, plasma displays, magneto-optical disks, high-powered lasers fluorescent lamps and hybrid cars (1). Increasing demand of REEs may cause the environmental pollution by these elements. Despite importance of physics and chemistry of REEs, the significance of REEs in biology has been overlooked. In our laboratory, during the study on the relationships between REEs and microorganism we isolated a soil bacterium, identified as Bradyrhizobium sp. CE-3 whose methanol dehydrogenase (MDH) activity in crude cell-free extract was increased several times when grown in 1/10 nutrient medium containing Ce. This is of interest that REEs exhibited the physiological effects on enzyme expression of microorganisms. Bradyrhizobium japonicum USDA110 has been widely used as standard to investigate the physiological, biochemical and genetic characterizations of the genus Bradyrhizobium. Kaneko et al. published the complete genomic nucleotide sequence of B. japonicum USDA110 and pointed out that this bacterium has a gene encoding a MDH large subunits-like protein at blr locus 6213 (2).*

In this report, I describe the effects of Ce and methanol on growth and expression of MDH activity of B. japonicum USDA 110, and that purification and some properties of the enzyme.

Growth behaviors and MDH activity: *The 1/10 diluted nutrient medium was used in this study. Methanol and Ce were added at 0.5% and 30 µM, respectively. Bacterium was cultured with rotary shaker (120 rpm) at 30^0C. Cells were harvested by centrifugation, washed with 20mM Tris-HCl buffer (pH 8.0), and suspended in the same buffer. Cells were disrupted by sonication. After centrifugation, the supernatant was used as cell-free extract. Activity of MDH was determined according to method of Day and Anthony (3). Protein concentration was determined by using BCA Protein Assay Kit.*

Growth of B. japonicum USDA110 exhibited remarkable increase in the presence of both 30 µM Ce and 0.5% methanol. This results suggest that Ce is important role in methanol metabolism of the genus Bradyrhizobium. In addition, activity of MDH was remarkably increased by Ce and methanol. MDHs of Methylobacterium spp. were found to increase several times by Ce. It seems that Ce is involved in induction of MDHs of methylotrophic bacteria.

Purification of MDH: *Ce-induced MDH was purified by three purification steps. The enzyme was purified 16 fold with yield of 7% and migrated as a single band (67 kDa) on SDS-PAGE (4).*

Properties of purified MDH: *By gel chromatography MW of native MDH was estimated to be approximately 86 kDa. This result suggests that the MDH was monomer. Recently the monomeric MDH which was a product of xoxF (synonym mxaF') gene of Methylobacterium extorquens AM1 was reported (5). The enzyme was more active to primary alcohols such as ethanol (93%), 1-Propanol (93%), and 1-butanol (93%) rather than secondary alcohols such as 2-propanol (36%) and 2-buthanol (36%), relative to methanol (100%). The pH and temperature optimum was 9.0 and 35^0C, respectively. Km for methanol and Vmax were determined to be 0.32 mM and 11.0 U/mg protein by Lineweaver-Burk plots. The N-terminal amino acid sequence was determined to be 1-NDELHKMAQNPKDWVMP-17. The amino acid sequence was highly identity to that of deduced amino acid sequence of MDH large subunit-like protein encoded by mxaF' (3).*

Keywords: Ce, methanol dehydrogenase, *Bradyrhizobium japonicum*, methanol

Category: *Agriculture Science*

Presentation Media: Oral Presentation

References

[1] Adachi G. (1999). *Science of rare earths*. Kagaku Dojin, Kyoto.

[2] Day DJ, and Anthony C. (1990). *Method in Enzymology*. Academic Press,Inc, London.

[3] Kaneko T, Nakamura Y, Sato S, Minamisawa K, Uchiumi T, Sasamoto S, Watanabe A, Idesawa K, Iriguchi M, Kawashima K, Kohara M, Matsumoto M, Shimpo S, Tsuruoka H, Wada T, Yamada M, and Tabata S. (2002). Complete genomic sequence of nitrogen-fixing symbiotic bacterium Bradyrhizobium japonicum USDA110. *DNA Res* 9: 189-197.

[4] Laemmli UK. (1970). Cleavage of structural proteins during the assembly of the head of bacteriophage T4. *Nature* 227: 680-685.

[5] Schmidt S, Christen P, Kiefer P, and Vorholt JA. (2010). Functional investigation of methanol dehydrogenase-like protein XoxF in Methylobacterium extorquens AM1. *Microbiology*. Microbiology Papers in Press. Published May 6, 2010 as doi:10.1099/mic.0.038570-0

Outcrossing Rate Estimation of Cajuputi Tree (*Melaleuca cajuputi* subsp. *cajuputi*) with Isozyme Marker

Rani Agustina Wulandari[1], Anto Rimbawanto[2], Taryono[1], Noor K. Kartikawati[2]

[1]Faculty of Agriculture, Gadjah Mada University, Yogyakarta, Indonesia
[2]Centre Forest Biotechnology and Tree Improvement, Pakem, Yogyakarta, Indonesia

agust_rani@yahoo.com, rimba@indo.net.id, tariono60@gmail.com

Abstract. *One reference in further breeding programs of the* Melaleuca cajuputi *subsp.* cajuputi *is by knowing the mating system. This study observed outcrossing rate of* Melaleuca cajuputi *subsp.* cajuputi *and the results can be used as information on the breeding programs.*

Biochemical markers used in the observation for the level of inbreeding is the isozyme. While the enzyme staining system used is Phosphoglucose Isomerase (PGI) and Esterase (EST). The sample materials used are natural crossing seeds plants Melaleuca cajuputi subsp. cajuputi in the progeny trial seed orchard Paliyan, Gunung Kidul, Yogyakarta, Indonesia as much as 10 selected trees. The steps in the process of inbreeding rate of the seeds are: collected seed, seed germinated, enzyme extracted, electrophoresed, and stained with enzyme staining. Data analysis program used was Genetic Data Analysis (GDA).

Analysis results using GDA program has shown that outcrossing rate in the Melaleuca cajuputi *subsp.* cajuputi *is very high, it is 90.1%). On the other hand, the result of the previous studies (Butcher* et al. *1992) has noted that the outcrossing rate of* Melaleuca alternifolia *is also very high (93%)). This condition was caused by the self-incompatibility (Kartikawati, 2005), protandri mechanism, transfer of pollen from tree to tree with the help of pollinator, and plant spacing or plant density.*

LOKUS	Fam 2	Fam 3	Fam 8	Fam 9	Fam 11	Fam 12	Fam 14	Fam 18	Fam 19	Fam 25	Overall
EST-1	0.5	***	***	***	0.222	***	***	***	***	0.5	0.183
EST-2	0.462	***	***	0.364	0.417	0.462	***	0.364	***	***	0.092
PGI-1	0.3	***	0.222	***	0.3	0.364	0.222	***	0.222	1	0.114
PGI-2	0.774	0.596	0.65	0.364	***	0.5	0.222	0.364	0.3	0.417	0.068
Overall	0.539	0.596	0.447	0.364	0.214	0.444	0.222	0.222	0.26	0.641	0.099

Figure 2. Inbreeding rate of Melaleuca cajuputi *subsp.*cajuputi *with isozyme marker*

Figure 2. showed low inbreeding rate in Melaleuca cajuputi *subsp.* cajuputi *(9.9%) or high outcrossing rate (90.1%) that appropriate with the results of previous research by Butcher* et al. *(1992) that described the high level of outcrossing rate on* Melaleuca alternifolia*. According to Kartikawati (2005), high levels outcrossing rate on* Melaleuca cajuputi *subsp.* cajuputi *is caused by high self-incompatibility that widespread mechanism in flowering plants that prevents inbreeding and promotes outcrossing. Each flower in the plants are generally self-incompatible hermaphroditic and has a complete flower. Anthers and pistils are in one flower nearby. Pistils can recognize and reject pollen from the same flower and pollen from the flowers closely genetically, so that self-pollination on a single tree can not be happened. In plants that have the nature of self-incompatibility when a pollen grain produced in a plant reaches a stigma of the same plant or another plant with a similar genotype, the process of pollen germination, pollen tube growth, ovule fertilization, and embryo development is halted at one of its, stages , and consequently no seeds are produced. Thus ovary / stigma can only be pollinated by pollen from other trees (in this case*

different genotypes). In addition, the pollinator and plant spacing is close enough allows pollen movements.

Output of this research can be used as a guidance for breeding program of Melaleuca cajuputi *subsp.* cajuputi, *so the information of mating system can be used as a guidance in the manufacture of seed*

113

orchards for breeding program. One of the aim Melaleuca cajuputi *subsp.* cajuputi *breeding program are new variety with high yield and high oil content. This research result showed that* Melaleuca cajuputi *subsp.* cajuputi *outcrossing rate is very high, so outcrossing will occur naturally. Depends on what kind of superior plant that will be expected (high yield and high oil content), the composition of the plants (with specific and superior traits) in the manufacture of seed orchard should be considered. Finally new varieties with superior traits will be obtained.*

Keywords: *Melaleuca cajuputi*, inbreeding rate, isozyme marker

Category: *Agricultural Science*

Presentation Media: Oral Presentation

References

Books

[1] Haines, R. 1994. Biotechnology in Forest Tree Improvement. FAO Forestry Paper. FAO Fiat Panis. Rome.

[2] Soltis, D.E. and P. S. Soltis. 1989. Isozymes in Plant Biology, Advances in Plant Sciences Series, Vol.4. Dioscorides Press. Portland. Oregon.

Journals

[3] Butcher, P.A., J.C. Bell, and G.F. Moran. 1992. Patterns of Genetic Diversity and Nature of the Breeding System in *Melaleuca alternifolia* (Myrtaceae). Australian Journal of Botany 40 : 365-375.

[4] Susanto, M., J.C. Doran. R. Arnold, and A. Rimbawanto. 2003. Genetic variation in Growth and Oil Characteristics of *Melaleuca cajuputi* subsp. *cajuputi* and Potential for Genetic Improvement. Journal of Tropical Forest Science : 15(3) : 469-482.

[5] Kartikawati, N,K. 2005. Tingkat Inkompatibilitas Bersilang Sendiri pada Tanaman Kayu Putih. Jurnal Penelitian Hutan Tanaman 2 (3) : 141-147.

Green Composites Based on Microfibrillated Cellulose and Polylactic Acid

Lisman Suryanegara[1], Antonio Norio Nakagaito[2] and Hiroyuki Yano[1]

[1] **Research Institute for Sustainable Humanosphere, Kyoto University, Gokasho, Uji, Kyoto, 611-0011, Japan**
[2] **Department of Chemistry and Biotechnology, Graduate School of Engineering, Tottori University, 4-101 Koyama-cho Minami, Tottori, 680-8552, Japan**

Abstract. Polylactic acid (PLA) is a versatile polymer made from renewable agricultural raw materials that are fermented to produce lactic acid. PLA offers great promise in a wide range of commodity applications due to good stiffness and strength. Another feature is the fact that PLA can be processed similarly to polyolefins. Because of its mechanical properties and the ease with which it can be processed, PLA has great potential to replace petroleum-based plastics. However, the drawbacks of PLA are low toughness and slow crystallization speed. In this study, we evaluated the thermal and mechanical properties of microfibrillated cellulose (MFC) reinforced semi-crystalline PLA, with the goal of reducing the time required to fabricate PLA parts while maintaining the dimensional stability of molded samples for posterior heat treatment.

PLA and MFC at fiber content of 0, 3, 5, 10, and 20 wt% were mixed in dichloromethane. After the mixtures were dried at room temperature followed by vacuum-drying, a kneader was used to obtain homogenous compounds. The compounds were hot pressed into films and the melted samples were immediately quenched in liquid N_2 to bring them to a fully amorphous state. Some of them were subjected to annealing to obtain samples with different degrees of crystallinity. The mechanical properties were studied with tensile test. The thermal properties were evaluated by thermo-mechanical analysis (TMA) and dynamic mechanical analysis (DMA). The degree of crystallization was investigated by X-ray diffraction (XRD) and differential scanning calorimetry (DSC).

Figure 1 shows that the addition of 20 wt% of MFC in PLA improved the storage modulus of crystallized PLA at a high temperature (120 °C) from 293 MPa to 1034 MPa. Table 1 reveals that the annealing time required to obtain PLA composite with fiber content of 10 wt% at a crystallinity (Xc) of 17% was only around one-seventh of the time needed to fully crystallize neat PLA (Xc: 41%). Interestingly, both materials had comparable rigidity above the glass transition temperature (T_g) and creep deformation at around T_g.
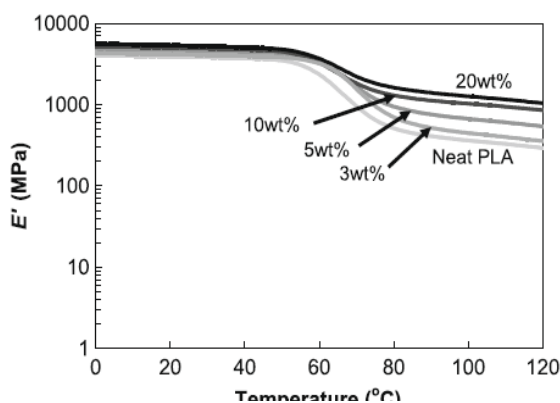
Figure 1. Effect of MFC contents (wt%) on the temperature dependency of the storage modulus under crystallized states

Annealing time (min)	Crystallinity of PLA (%)	Crystallinity of composite (%)
0	0	0
1	0	4
2	0	9
3	0.4	17
4	0.4	25
5	1.6	32
10	25	42
20	40	43
60	41	43

Table 1. Degrees of crystallinity of PLA and PLA/MFC composites at a fiber content of 10 wt% with different annealing times

Keywords: MFC, PLA, nanocomposites

Category: *Agriculture Science*

Presentation Media: Oral Presentation

References

[1] Iwatake A, Nogi M, Yano H (2008). Cellulose nanofiber reinforced polylactic acid. *Compos Sci Technol.* 68:2103-2116.

[2] Suryanegara L, Nakagaito AN, Yano H (2009). The effect of crystallization of PLA on the thermal and mechanical properties of microfibrillated cellulose- reinforced PLA composites. *Compos. Sci. Technol.* 69(7-8):1187-1192.

[3] Suryanegara L, Nakagaito AN, Yano H (2010). Thermo-mechanical properties of microfibrillated cellulose-reinforced partially crystallized PLA composites. *Cellulose.*17:771-778.

NATURAL SCIENCE

An Ecological Study in an Urban Fringe Landscape with an Aggressive Plant

Fabiola B. Saroinsong[1]

[1] Sam Ratulangi University – North Sulawesi, Indonesia

Email address: fabiolasaroinsong@ymail.com

Abstract. *Studies on landscape ecology have been challenged by the problems triggered by aggressive plants. Aggressive plants appear to have specific traits or combinations of specific traits that allow them to outcompete other plants. Sometimes they just have the ability to grow and reproduce rapidly; other times it's more complex, involving a multiplex of traits and interactions for example combination of some characteristics advantageous to invasion such as extremely rapid sprout growth, the gap- and light-independence of sprouts to reach canopy height, vigorous rhizome extension, and great tolerance to strong winds and heavy snow accumulation result in domination of a plant in a landscape (Isagi et al., 1997; Isagi and Torii, 1998; Ohno et al., 2002a; Ohno et al., 2002b; Saroinsong et al., 2006). This may cause some ecological, economic, and or health impacts. Bamboo forest is one of the typical secondary forests in Japan, which were artificially maintained but later have been abandoned. The massive expansion problems of the bamboo forests have been studied. It is principally important to understand the expansion pattern and process of bamboo forests in a landscape scale in order to develop a proper management strategy for controlling massive expansion. It is also necessary to evaluate the reason and the process behind the expansion of bamboo forest to adjacent forest in a stand scale. This study attempts to focus on life history traits of Phyllostachys nigra Munro var. Henonis Stapt that facilitate its invasion to adjacent forest. This study also discusses relationship between the P. nigra v. Henonis and trees. The objectives are to observe the emergence pattern, survival pattern, and turn over rates of culms of the P. nigra v. Henonis, and to evaluate the co-existence between P. nigra v. Henonis culms and trees. A permanent plot which comprises P. nigra v. Henonis was established in a bamboo forest located in the urban fringe landscape of Okayama City, western Japan. This species has large culms with leptomorph rhizomes. The bamboo forest is adjacent to a secondary deciduous broad-leaved forest predominated by Quercus serrata, which has a closed canopy. Both the bamboo forest and decidous broad-leaved forest have been un-managed for at least 40 years. The bamboo forest is located in a lower region than the deciduous broad- leaved forest. From aerial photos (1974, 1980, 1989, and 1995), it was observed that the bamboo forest has expanded, and the new occupation area of bamboo forest was formerly deciduous broad-leaved forest. A field survey is conducted. Emergence pattern, survival pattern, mortality rates of culms, and relationship between culms and trees are evaluated, and compared between the edge, the intermediate, and the interior of the bamboo forest. The edge is the border zone between bamboo forest and other forest, ie. frontier area. P. nigra v. Henonis culms in edge maintain higher recruitment rates than culms in interior. There is great longevity of culms. Culms in edge maintain lower mortality rates during observation. Conversely, culms in interior have higher mortality rates. The bamboo forest has expanded its area gradually to encroach upon the neighboring forest. During bamboo forest expansion with increases in density and aboveground biomass, understory trees became fewer. Beside, tree regeneration was suppressed because no recruited trees were found in areas that bamboo culms occupied. Dead trees spread outward over time, concomitant with the increase in density of bamboo culms. Competition between the bamboo stand and understory trees apparently increases the understory trees mortality because the rate is smaller in the stand with sparse culms and dense trees. The mortality in understory trees was discussed in relation to light intensity which had a significantly negative relationship with total culm density. As conclusions, the expansion of the bamboo forest is generated by rhizome extension of P. nigra v. Henonis culms, and supported by generous recruitment, great longevity, and high survivorship of culms in the expanding areas. Development characteristics in the bamboo forest edge provide unique opportunities for outward stand establishment. During the bamboo forest development and expansion, competition between the P. nigra v. Henonis stand and understory trees apparently increased the understory trees' mortality.*

Keywords: *Phyllostachys nigra,* expansion, recruitment, mortality

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

Journals

[1] Isagi, Y., Kawahara, T., Kamo, K., Ito, H. (1997). "Net production and carbon cycling in a bamboo *Phyllostachys pubescens* stand". *Plant Ecol*. 130: 41-52.

[2] Isagi, Y., Torii, A. (1998). "Range expansion and its mechanism in a naturalized bamboo species, *Phyllostachys pubescens*, in Japan". *J. Sustain. Forestry* 6(1/2): 127-141.

[3] Ohno, T., Kaga, H., Shimomura, Y., Masuda, N. (2002a). "A study of the relationship between bamboo forest and the surrounding land-use: case study on Kishiwada City, Osaka". *Papers Environ. Info. Sci*. 16: 369-374 (in Japanese with English abstract).

[4] Ohno, T., Kaga, H., Shimomura, Y., Masuda, N. (2002b). "A study of the pattern of bamboo forest expansion in Kishiwada City, Osaka". *Landscape Res. Japan* 65(5): 603-608 (in Japanese with English summary).

[5] Saroinsong, F.B., Sakamoto, K., Naoko, M., Yoshikawa, K. (2006). "Stand dynamics of a bamboo forest adjacent to a secondary deciduous broad-leaved forest". *J. Jap. Soc. Reveget. Tech.* 32(1): 15-20.

Gound Deformation Detect by AGNeSS (Aceh GPS Network for Sumatran fault System)in North Sumatra after the 2004 Sumatra-Andaman Earthquake

Endra Gunawan[1], Takeo Ito[1], Fumiaki Kimata[1], Takeo Tabei[2], Irwan Meilano[3], Didik Sugiyanto[4], Irwandi[4], Muksin[4], Agustan[5]

[1] Research Center for Seismology, Volcanology and Disaster Mitigation, Graduate School of Environmental Studies, Nagoya University, Nagoya, 464-8602, Japan

[2]Department of Natural Environmental Science, Kochi University, Japan

[3]Department of Geodetic and Geomatics Engineering, Faculty of Earth Science and Technology, Institute of Technology Bandung, Indonesia

[4]Physics Department, Faculty of Mathematics and Natural Science, Syiah Kuala University, Indonesia

[5]The Agency For the Assessment and Application Technology, Indonesia

Email address: endra@seis.nagoya-u.ac.jp

Abstract. *Sumatran fault, which accommodates a right lateral strike slip components, lies in the inland of Sumatra, at the east side of Sunda trench, where the Australian/Indian plate subducts beneath the Eurasian plates. The deformation along the Sumatran fault has been largely studied based on variety of geodetic and geological observations. Using GPS data, strain calculation in the central region of Sumatran fault (1°S to 3.55°N) shows extension rate of 0.9 to 1.7 x 10-7 /yr and compression rate of -0.9 to -1.5 x 10-7 /yr [McCaffrey et al., 2000].*

On December 26, 2004, a great M9.3 Sumatra-Andaman earthquake occurred at the subducting zone in the northern part of Sunda trench. Coseismic displacements toward southwest of 2 – 3 m were observed from the GPS measurements in Aceh before and after the earthquake [Subarya et al., 2006; Meilano et al., 2007].

After the 2004 M9.3 Sumatra – Andaman earthquake, we established the AGNeSS (Aceh GPS Network for Sumatran Fault System) consisting with 7 continuous and 20 campaign sites in northern Sumatra to discuss the postseismic displacements and strain accumulation along the Sumatran fault. There were 11 campaigns until November 2009.

Firstly, large southwestward station velocities of 39 – 44 cm/yr as postseismic displacements are detected from the GPS measurements in northwestern AGNeSS in 2005. Station velocities at Banda Aceh are continued and reducing to 8 cm/yr in 2009. Postseismic displacement is estimated to be over 100 cm in north Sumatra until 2009, which is corresponding a half of the coseismic displacement.

Secondly, postseismic displacements of 5 cm/yr are detected around Meulaboh, 200 km southeastward from Banda Aceh. However large postseismic velocities over 10 cm/yr are observed around Banda Aceh. It is just corresponding to the estimation of largest fault slip over 20 m in the Aceh segment of Aceh.

Thirdly, in northwestern AGNeSS, large dilatations of 5 x 10-7/yr are observed along the west coast and maximum dilatation of 5 x 10-7/yr in northeast-southwest extension. In southeastern AGNeSS, large dilatation and maximum shear strain of 4 x 10-7/yr are observed along the Sumatran fault. Meanwhile, maximum principal strains are in east-west extension.

Keywords: Sumatran fault, 2004 Sumatra-Andaman earthquake, strain accumulation, GPS measurement, displacement, velocity, postseismic deformation.

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

Books

[1] Meilano, I., Y. Ohta, F. Kimata, T. Ito, T. Tabei, D. Darmawan, H. Andreas, H. Z. Abidin, M. A. Kusuma, D. Sugiyanto, and Agustan (2007), *Two years GPS observation in Aceh, in The 3rd Investigation Report of 2004 Northern Sumatra Earthquake*, Nagoya University, 7-10.

Journals

[2] McCaffrey, R., P. Zwick, Y. Bock, L. Prawirodirdjo, J. Genrich, S. S. O. Puntodewo, and C. Subarya (2000), Strain partitioning during oblique plate convergence in northern Sumatra: Geodetic and seismologic constraints and numerical modeling, *Journal of Geophysical Research*, 105, 28,363 – 28,376.

[3] Subarya, C., M. Chlieh, L. Prawirodirdjo, J.-P. Avouac, Y. Bock, K. Sieh, A. Moltzner, D. Natawidjaja, and R. McCaffrey (2006), Plate-boundary deformation of the great Aceh-Andaman earthquake, *Nature*, 440, doi 10.1038/nature04522.

Magnetic Response of Stratified Metal-Dielectric Metamaterials in Optical Regime

Aunuddin S. Vioktalamo, Teruya Ishihara

Tohoku University, 6-3 Aramaki, Sendai, Japan

asvioktalamo@sspp.phys.tohoku.ac.jp

Abstract. *Stratified metal-dielectric metamaterials, hereafter referred to as SMDM, is an artificial composite consisting of negative-permittivity media sandwiched by two identical dielectric slabs. In 2005, Zhou et. al [1] suggested that in this design the internal magnetic field is enhanced, while Iwanaga [2] predicted huge magnetic resonance. Accordingly, new optical phenomena are expected from SMDM where μ is not unity, having possibility to emit resonance in particular frequency. SMDM is easy to fabricate and it has simple field distribution with a broader bandwidth due to the non-resonance character.*

The purpose of this research is to investigate the microscopic field distribution of SMDM, numerically and experimentally, where one unit cell of SMDM is defined by Al_2O_3 (60 nm)/ Ag (30 nm)/ Al_2O_3 (60 nm). By considering the appropriate boundary condition at the interface, complex transmission and reflection can be calculated using the transfer matrix method. Furthermore, the impedance Z and refractive index n for this multilayer structure can be obtained, and the second set of analytic variable, electric permittivity and magnetic permeability, are extracted. The enhancement of magnetic field is occurred in the metal layers, while it has a node at the dielectric interface at the unit cell. The cusp-like features at the dielectric-metal interface are due to induced current in metal.

Symmetric structures of SMDM are used in our experiment. The samples were grown on 0.33 mm sapphire using RF sputtering method, where the sputtering rate of Ag and Al_2O_3 were 1 and 0.01 nm/s, respectively. The optical spectra show small thickness reduction of Al_2O_3 became 57 nm. We fabricated 1-3 period SMDM as comparison.

The Mach Zehnder interferometer is used to retrieve phase information of SMDM [3]. In our experiment, we use beam displacing prism to separate light with s- and p- polarization for input coupler, as well as output coupler to recombine them. Liquid crystal works as a retarder to compensate phase shift for particular polarized light by varying an applied voltage. By following Jones Matrix vector analysis, we can obtain the relation between intensity and phase information of sample. The phase of reflection is retrieved using similar technique with transmission. Numerical calculation is carried out by considering bulk optical constants data of silver taken from literature [4] and the dielectric constant of Al_2O_3 is assumed to be constant (2.7). The good agreement is achieved for phase information retrieved from calculation compare with experiment results.

The real permeability of 3-period SMDM is about two in the region between 500 nm and 600 nm and increase rapidly around the first photonic bandgap. The largest of permeability is observed at 472 nm with the number about 20 and 17, for calculation and experiment, respectively. The origin of high permeability resonance is due to the inhomogeneities of the filed distribution in the unit cell. The condition is occurred when a half of the incident wavelength in the structure matches to a unit cell size, where the microscopic magnetic field is concentrated in the metal layer. This type of resonance is periodicity independent, meaning the position of resonance is similar for 1-3 period SMDM. Another dispersive resonance is observed at 530 nm for experimental data which corresponds to the Fabry-Perot interference.

We have successfully demonstrated a magnetic response of metal-dielectric multilayer with sub-wavelength period. Measurement of SMDM is the first step to start the advance investigation of electromagnetic metamaterials. Since additional layer does not change the resonance position as wavelength function, then SMDM is possible to fabricate bulk size samples consisting many layer of SMDM.

Keywords: Metamaterials, optical magnetism.

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

[1] Zhou, L., Wen, W., Chan, C. T., and Sheng, P. (2005). "Electromagnetic-wave tunneling through negative-permittivity media with high magnetic fields." *Phys. Rev. Lett.,* 9, 243905-1 - 243905-4.

[2] Iwanaga, M. (2008). "Emergence of optical magnetism in stratified metal-dielectric metamaterials." *Phys. Stat. Sol*. (B), 245(12), 2684-2687.

[3] Drachev, W. P., Cai, W., Chettian, U., Yuan, H. K., Sarychev, A. K., Kildishev, A. V., Klimeck, G., and Shalaev, V. M., "Experimental verification of an optical negative-index material." *Laser Phys. Lett.*, 3(1), 49-55

[4] Johnson, P. B., and Christy, R. W. (1972). "Optical constants of the noble metals." *Phys. Rev. B*., 6(12), 4370-4379

Demonstrations of Mechanics Laws in Physics
Using Frictionless Method

Ali Khumaeni[1] and Kiichiro Kagawa[2]
[1]Program of Nuclear Power and Energy Safety Engineering,
University of Fukui, Japan
[2]Research Institute of Nuclear Engineering,
University of Fukui, Japan

Email address: khumaeni@gmail.com, kagawa@f-edu.u-fukui.ac.jp

Abstract. *Mechanics is the most fundamental subject in all branches of physics. It is basically difficult to study other fields of physics without mastering the general laws in mechanics. Thus, it is urgently needed for students to comprehensively grasp the concepts of mechanics. However, in most classes of junior and senior high schools, physics is theoretically taught, and teachers ask the students to practice to solve physics problems related to the studied theory. In this case, the students still don't have clear concepts and finally they become to dislike physics. This is a serious problem for the countries in which the science and the technology are crucial for future development such as Indonesia. In order to overcome this problem, the demonstrating experiment, namely visualizing and observing actual phenomena that are being studied theoretically, should be carried out to gain the complete concepts. However, the experiments of fundamental mechanics laws, such as the first law, the second law, and the third law of motions, momentum conservation law, and energy conservation law (between the potential energy and the kinetic energy) are generally difficult to be conducted due to the disturbance of friction between the object and the plate surface.*
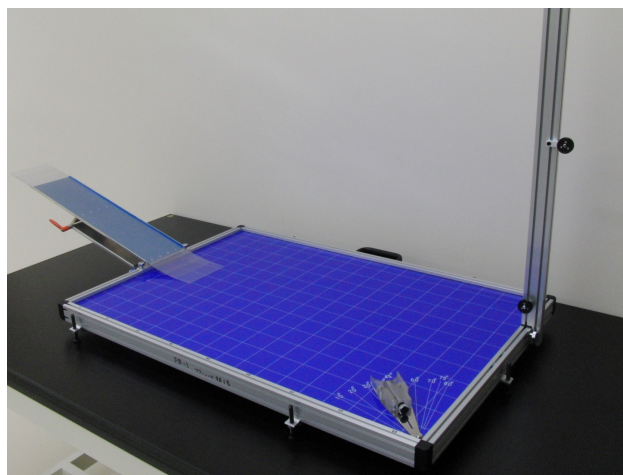
Figure 1 Equipment for demonstrating the mechanics laws

In this study, new equipment for demonstrating the mechanics laws has successfully been constructed utilizing fine sphere plastic beads as shown in Fig. 1. Fine plastic beads (0.3 mm in diameters) function as ball bearings to reduce the friction between the object and plate surface. To demonstrate the third Newton's

law, the special magnetized-Petri dishes were employed as objects, while to examine the energy conservation law, the high-angled frictionless slope consisted of the thin plastic sheet on which the fine plastic beads were attached by the electrostatic force was employed. By this method, a quantitative measurement of energy conservation law has successfully been carried out with a small error of less 3 %.

Furthermore, this experimental method is not only limited to make qualitative observation but also allows making quantitative measurement by using familiar tools such as stopwatch, ruler, and speed meter. The strong advantage of this frictionless method is that we can always use the same object like Petri dishes for demonstrating many kinds of mechanics laws, such as the first law, the second law, and the third law of motions, momentum conservation law, and energy conservation law. This innovative method can solve the present problem in physics education.

Keywords: Mechanics laws; the first law; the second law; the third law; energy conservation law; sphere plastic beads; frictionless method;

Category: *Natural Sciences*

Presentation Media: Oral presentation

Selected References

[1] Khumaeni, A., Tanaka, S., Kobayashi, A., Lee, Y. I., Kurniawan, K. H., Ishi, K., and K. Kagawa. (2008). "Demonstration of action and reaction law and energy conservation law using fine sphere plastic beads". Physic. Educ., 43, 637-643.

Antifeedant Activity of 7-Hydroxy-6-methoxycoumarin and Its Related Compounds against *Coptotermes formosanus* Shiraki

Morina Adfa[1, 2], Mamoru Koketsu[1], Kenichi Komura[1] and Tsuyoshi Yoshimura[3]
[1]**Department of Materials Science and Technology, Faculty of Engineering, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan**, E-mail address: koketsu@gifu-u.ac.jp
[2]**Jurusan Kimia, Fakultas MIPA, Universitas Bengkulu, Jl. Raya Kandang Limun Bengkulu, 38371, Indonesia**, E-mail address: morinaadfa@yahoo.com
[3]**Research Institute for Sustainable Humanosphere, Kyoto University, Gokasho, Uji, Kyoto 611-0011, Japan**

Abstract. *Termiticidal and antifeedant activities of P. javanicum extract were investigated. The ethyl acetate fraction showed the highest termiticidal activity and good antifeedant activity. 7-hydroxy-6-methoxycoumarin (1), quercetin, and stigmasterol were isolated from the fraction. Evaluation of the antifeedant activity of 7-hydroxy-6-methoxycoumarin, quercetin, and stigmasterol against C. formosanus Shiraki revealed 7-hydroxy-6-methoxycoumarin showed the highest activity among the three compounds. First, regarding to 7-hydroxy-6-methoxycoumarin, in order to investigate the structure–activity relationship (SAR) of the methoxy and hydroxy groups at the C-6 and C-7 positions of the coumarin skeleton, we synthesized several coumarin derivatives (2–6) whose chemical structures are similar to 7-hydroxy-6-methoxycoumarin (1). Finally we collected 10 compounds (**Fig. 1**) and tested them for antifeedant activity. All compounds except coumarin (9) showed antifeedant activity, 7-hydroxy-6-methoxycoumarin exhibited the strongest antifeedant activity among the 10 compounds tested, followed by 7-methoxycoumarin (4), 6-methoxycoumarin (3), and 6-hydroxycoumarin (7) (**Fig. 2**).[1) These results suggested that the methoxy or hydroxy groups at C6 and/or C7 positions of coumarin skeleton are important for antifeedant activity. Therefore, we continue this study to investigate the effect of various kinds of alkoxy group at C6 position of coumarin skeleton. We synthesized 12 compounds of the 6-hydroxycoumarin derivatives (7a–7l, **Fig. 3**). Crystal structure of 6-benzyloxycoumarin (7g) was determined by X-ray crystallography (**Fig. 4**).[2) Compounds (7a–7l) were tested for antifeedant and termiticidal activities, all of them exhibited antifeedant activity. Further studies on termiticidal activity of 6-hydroxycoumarin derivatives are in progress.*

Keywords: *Protium javanicum* Burm. f., *Coptotermes formosanus* Shiraki, 7-hydroxy-6-methoxycoumarin.
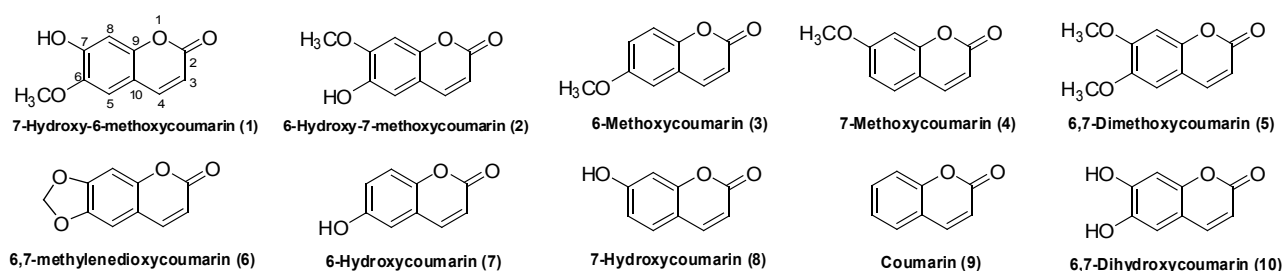
Fig. 1 Chemical structure of 7-hydroxy-6-methoxycoumarin (**1**) and its related compounds (**2–10**).
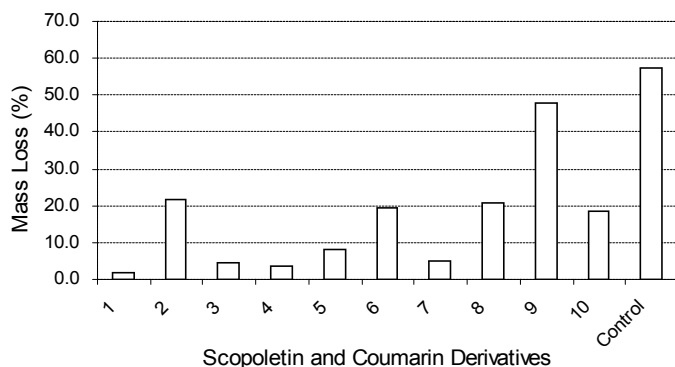
Fig. 2 Paper disc consumption of *Coptotermes formosanus* Shiraki after 14 days' exposure to compound **1** and its related compounds (**2**–**10**) in no-choice test. Numbers 1–10 refer to the compounds shown in **Fig. 1**.
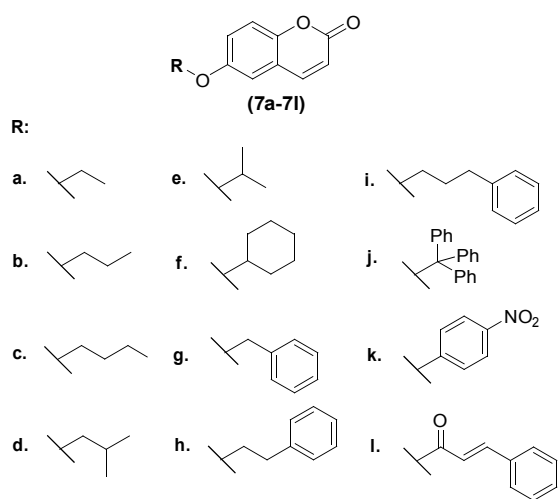
Fig. 3. Chemical structure of 6-hydroxycoumarin derivatives (**7a-7l**).
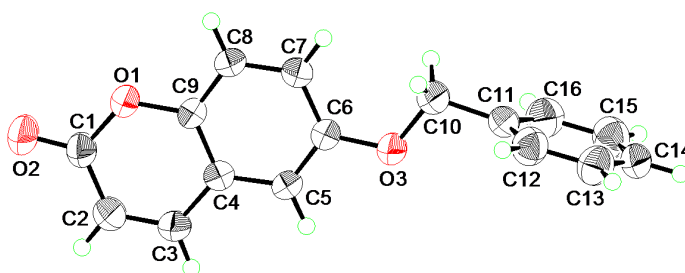
Fig. 4. The molecular structure of 6-benzyloxycoumarin (**7g**), showing 30% probability displacement ellipsoids and the atom numbering scheme.

Category: *Natural Sciences*

Presentation Media Presentasi: Oral Presentation

References

[1] Adfa, M., Yoshimura, T., Komura, K., and Koketsu, M. (2010). "Antitermite Activities of Coumarin Derivatives and Scopoletin from *Protium javanicum* Burm. f.", *J. Chem. Ecol.* **36** (7), 720-726.

[2] Adfa, M., Koketsu, M. and Ebihara, M. (2010). "6-Benzyloxycoumarin" *Acta Cryst.* **E66**, o2190.

Two Dimensional Cellular Automata Approach for Disaster Spreading

Achmad Basuki[1,2], Kohei Arai[1]
[1]Departement of Information Science, Saga University, Japan
[1]Electrical Engineering Polytechnic Institute of Surabaya, Indonesia
basuki@eepis-its.edu, arai@is.saga-u.ac.jp

Abstract. *Cellular Automata (CA) based simulations are widely used in a great variety of domains, especially disaster spreading such as the forest fire, flood and mudflow. They allow for spectacular displays and numerical predictions. Each of the three models can be associated with an important natural hazard: the forest fire model with forest fires, the sand-pile model with flood, and the minimization difference model with mudflow. We show that each of the three natural hazards self-organized that are well approximated by probabilistic material moving [1]. These approaches have important implications for probabilistic hazard assessments that often occur in Indonesia.*

On the forest fire model, we begin with a square grid of sites; there are blank node, tree and fire. At each time step, some trees around fire will be fired by sparking probability f_s [1], and fire will be stopped by stopping probability f_c. Stopping probability f_c is fix number depend on tree material that shows how fast tree will be fired. Sparking probability is variable number depend on material, wind speed and wind direction. Tree material parameter shows possibility to be fired. Wind speed parameter defines the size of neighbors, and shows that model uses dynamic neighborhood model. Wind direction parameter defines the angle of fire moving.

On the fluid flow model for flooding, we use extended Argentini's model [2]. The state describes number of fluid particles. If fluid particles occupy in one node and no obstacles are in the forward, they will move forward. If fluid particles occupy in one node and there are obstacles in the forward, the will move left-right randomly or stay. We assume that the time variable is incremented by discrete unitary values, so that each row of fluid molecules goes forward to the next at the same instant, for every occupied position and for every row of the grid. The rules which form the model of the used cellular automaton are schematically so described.

The minimization difference approach is one of CA approach to simulate hot mudflow spreading. It obtains a good model to simulate the lava flow with many parameters [3]. In this simulation mud blows from the main crater (big hole), and mud moves to other locations depend on slope difference and mudflow parameters. The amount of mud moving is called as mass transport. We use probability values adjustment p_m and p_{vis} to flow some mass from the center cell to its neighbor cells. Controlling of these probability values is suggested to improve the prediction results. We use three-time states; February 2008 as initial state, May 2008 and August 2008 as prediction states. The prediction results show the same location and direction with the real data.

CA approaches are first and foremost discrete dynamical systems performing parallel computation. They used in a great variety of cases. Further, in spite of the novelty of CA as modeling tools are rooted in traditional physics [5]. One virtue of our systematic examination of what is currently done with CA is perhaps to shed a new light on the relationships between modeling and computation. By using of CA approaches as modeling tools, we can visualize disaster spreading prediction and determine some dangerous area around disaster. It is important to anticipate the bigger impact and damage.

Keywords: cellular automata, probabilistic material moving, disaster spreading, forest fire, fluid flow, flood, mudflow.

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

Books

[1] Malamud, B.D., Turcotte, D.L. (2000), Cellular-Automata models applied to natural hazards, IEEE Computing in Science & Engineering, Vol. 2, No. 3, pp. 42-51, 2000.

[2] Argentini. G (2003), A first approach for a possible cellular automaton model of fluids dynamic, New Technologies & Models, Information & Communication Technology Department Riello Group, Legnago (Verona), Italy, February 2003.

[3] Ciro Del Negro, Luigi Fortuna, Alexis Herault, Annamaria Vicari (2008), Simulations of the 2004 lava flow at Etna volcano using the magflow cellular automata model, Bulletin of Volcanology, Volume 70, Number 7/May, 2008, pp. 805-812, Springer Berlin/Heidelberg, 2008

[4] Kohei Arai, and Achmad Basuki, 2010, A Cellular Automata Based Approach for Prediction of Hot Mudflow Disaster Area, Computational Science and Its Applications – ICCSA 2010, Part II, Lecture Notes in Computer Science 6017, pp. 119-129, Springer-Verlag Berlin Heidelberg, 2010

[5] D. Delahaye, J. Douvinet, D. Gaillard, P. Langlois, Modeling The Dynamic Effect of Catchment Morphology on Surface Flow Paths in Small Catchments of The Paris Basin, Session HS28, A-10777, France, European Geosciences Union, Vienna, Austria, 15-20 April 2007.

Lecturing on Satellite Imagery Processing and GIS based on Internet and Opensource Software

Ramdani, Fatwa[1]

[1] Geo-environment, Institute of Geography, Earth Science Department, Graduate School of Science, Tohoku University

(Lecturer Assistant in Remote Sensing and GIS Laboratoy)

Email address: fatwa@m.tains.tohoku.ac.jp

Abstract. *Information and communication technology have been growing rapidly during the last 2 decades The dot com bust just after the millennium resulted many opportunities for advance lecture ways, in this case for Remote Sensing and GIS class. With only single click we could find source or references for lecture materials. In field of Remote Sensing and GIS, recently become easier to find and download satellite imagery from official data provider website freely, but the aggravating circumstance is the expensive price for satellite imagery processing and GIS commercial software. This paper attempt to give solutions for this matter. At present we have many choices because of the presence of opensource software and online software tools. We can easily download from internet and use the software. The methods from this process are; firstly, we have to make sure that we have a good internet connection. Secondly, we have to prepare spatial data set, in this case is Landsat ETM+ satellite imagery, we can freely download from http://glovis.usgs.gov , decide the area of interest of our study and store it to our work folder. Thirdly, launch our ILWIS 3.6 (after we download from http://52north.org , and installed it to our computer), import the data to ILWIS format and make RGB (Red-Green-Blue) combination of natural color. Now we are ready to distinguish land use land cover from the Landsat ETM+ satellite imagery, in this case we want to now the urban growth in time series period, so we have to download minimum three different acquisition time of Landsat ETM+ satellite imagery. Fourthly, we want to update the road network. Open our Google Earth (http://earth.google.com)and zoom to our area of interest. Using add path tools at Google Earth (GE) toolbar, give name and start to digitize. After finish we will find our road network layer in the left side of GE. Right click this layer and choose copy. Fifthly, launch kml2shapefile from http://www.zonums.com/online/kml2shp.php, right click or simple just ctrl+v in the work window, export our data and store in our work folder. Lastly, open MapWindow (after we download from http://www.mapwindow.org/ and installed it to our computer). Load our time series satellite imagery and our road network. Make a layout map with cartography design and present it in pdf (we can download CutePDFWriter from http://www.filehippo.com/jp/download_cutepdf_writer/)file or print out our map and present it as hardcopy map. Finally, we can analyze urban growth from transportation access, in this case road network as a driver. This methods is the most simply method and freely to give lecture in satellite imagery processing and GIS based on online internet connection and opensource software. We can observe more rich function in ILWIS 3.6 and MapWindow for satellite imagery processing and others GIS work. This method is paperless and support to tackle global warming and climate change. The lack of this method is we should to make sure that we have fast and stable internet connection for download satellite imagery data and to install opensource software, if we choose online installation.*

Keywords: Satellite imagery processing, Landsat ETM+, GIS, Internet, Opensource, ILWIS 3.6, MapWindow, Google Earth, kml2shapefile.

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

Internet Sources:

[1] http://glovis.usgs.gov (Accessed at July. 30, 2010).

[2] http://52north.org (Accessed at July. 30, 2010).

[3] http://earth.google.com (Accessed at July. 30, 2010).

[4] http://www.zonums.com/online/kml2shp.php (Accessed at July. 30, 2010).

[5] http://www.mapwindow.org/ (Accessed at July. 30, 2010).

[6] http://www.filehippo.com/jp/download_cutepdf_writer/ (Accessed at July. 30, 2010).

Properties of Barabasi Albert Network Model

Ferry Astika saputra

Electronic Engineering Polytechnic Institute of Surabaya

Email address: ferryas@eepis-its.edu

Abstract. *Recently, it has been reported that structure of the complex networks including the Internet have the scale-free structure. Namely, the degree distribution at a router level obeys a power law. Many researchers have proposed model for these types of network. One of the representative network model Barabási-Albert (BA) scale-free network because its nodes degree distribution is close to the degree distribution of the Internet routers. In this paper, BA network model is introduced theoretically and with simulations.*

Introduction: *A network is a system of connected elements. In the Internet at a router level, elements of the network are routers, which are connected by physical/logical links. In general, a network consists of nodes and links. One of fundamental features of a network is its degree distribution. The degree of a node corresponds to the number of links connected to the node. The degree distribution P(k) defined as the relative number of nodes of degree k to the total number of nodes in the network. Structures of various networks have been attracting research interests, because many natural and artificial networks show scale-free degree distributions. Namely, degree distributions obey power laws. Researchers have tried to find universal features in those networks found in different fields [1, 2]. Examples are metabolic networks, food webs, WWW (World Wide Web) links, academic co-authorship relations, actor collaboration, and electric power-grid networks. Common features of these networks are random growth and preferential attachment mechanisms.*

The Internet is one of the most important communication media in modern societies. Despite its importance, the Internet has no center for controlling its flow and structure. As other autonomous evolving networks, the Internet has been observed in the viewpoint of scale-free properties. The degree distribution at a router level has been observed by Faloutsos et al. [3]. The degree distribution obeys a power law $P(k) \sim k^{\wedge}(-\gamma)$, where $\gamma \approx 2.2$. Most routers have small number of connections while a few routers have many connections to others.

Barabasi-Albert network model: One of the important features in the structure of the Internet is that the network seems to grow randomly. When we want to connect our home personal computers to the Internet, there may be some choice of providers.

When we select one of providers for connecting our computers to the Internet, our selection will be biased with some properties of providers. One of the most probable biases is the size of providers. We prefer to connect our computers to bigger providers rather than smaller ones. We called this selection mechanism preferential attachment. We will investigate the Barabási-Albert (BA) scale-free network, which is a random growing network with preferential attachment.

The initial state of the BA network consists of two nodes v_s $(s = 1,2)$ connected with two links. At every time step t, a new node v_s $(s = t)$ is created. It is connected to a randomly selected node $v_{s\prime}$ $(0 < s\prime < t)$ with the preferential probability, which is proportional to its degree $k_{s\prime}$. The number of nodes is kept equal to t.

A set of BA networks is introduced for discussing the master equation. At every time step $t + 1$, the probability that the s -th node is selected by the new node is k_s /K, where the total degree K is $2t$. The master equation of $P(k,t)$ is

$$(t+1)P(k,t+1) = tP(k,t) + \frac{k-1}{2}P(k-1,t) - \frac{k}{2}P(k,t) + \delta_{k,1} \qquad (2.1)$$

The stationary solution of the master equation (2.1) is

$$P(k) = \frac{4}{(k+2)(k+1)k}. \qquad (2.2)$$

The number of nodes with large values of k decays with a power law $P(k) = k^{-3}$. Namely, preferential attachment mechanisms seem to be one of origins of scale-free structures. We have performed simulations of constructing BA networks. We generate 100 networks. Each network has evolved up to 10000 nodes. Figure 2 shows the average degree distribution. The average degree distribution is well fit by the theoretical curve (2.2).
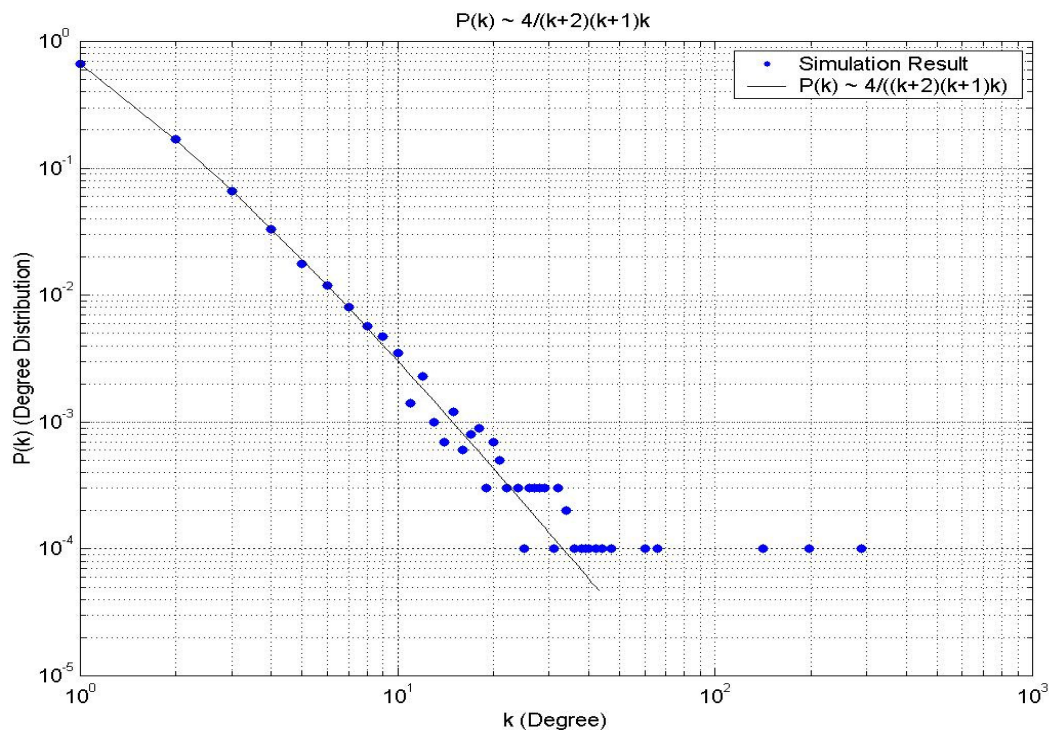
Figure 1: The average degree distribution of generated BA scale-free networks in the simulation and the theoretical curve P(k)=4/((k+2)(k+1)k)

Keywords: the Internet, scale-free, network, degree distribution

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

[1] R. Albert and A.-L. Barabási, Rev. Mod. Phys. 74, 47 (2002).

[2] J. F. F. Mendes and S. N. Dorogovtsev, Evolution of Networks: From Biological Nets to the Internet and the WWW (Oxford University Press, Oxford, 2003)

[3] Faloutsos, M., P. Faloutsos, and C. Faloutsos, 1999, Comput. Commun. Rev. 29, 251.

[4] Govindan, R., and H. Tangmunarunkit, 2000, in Proceedings of IEEE INFOCOM 2000, Tel Aviv, Israel (IEEE, Piscataway, N.J.), Vol. 3, p. 1371.

Development of Adsorbent from Waste Tea Leaves for the Perspective Recovery of Gold

Mokhammad Fajar Pradipta[1, 2], Katsutoshi Inoue[1]

[1] Department of Applied Chemistry, Saga University, Saga Japan

[2] Department of Chemistry, Faculty of Mathematics and Natural Science, Gadjah Mada University Indonesia

fajar.pradipta@gmail.com, inoue@elechem.chem.saga-u.ac.jp

Abstract. *Bio-wastes as sorbents have recently gained importance because of their comparable efficiency, easy availability and high cost effectiveness [1]. Biosorption of heavy metals occurs as a result of physicochemical interaction, mainly ion exchange or complex formation between metal ions and the functional groups present on the cell surface. Various functional groups involved are phosphate, carboxyl, amine and amide whose role in metal binding, however, is still not fully understood [2]. There is a considerable potential for adopting a natural, abundant and economical metal adsorption system, and tea leaves generated as waste in large could be used as an adsorbent for the removal of heavy metals from aqueous solution[3]. Tea leaves is known to contain several polyphenolics like catechol, tannic acid, gallic acid, pyrogallol, etc. Since the polyphenolic compounds easily take part in redox reactions, these active sites may be the effective sites for reduction of some metal.*
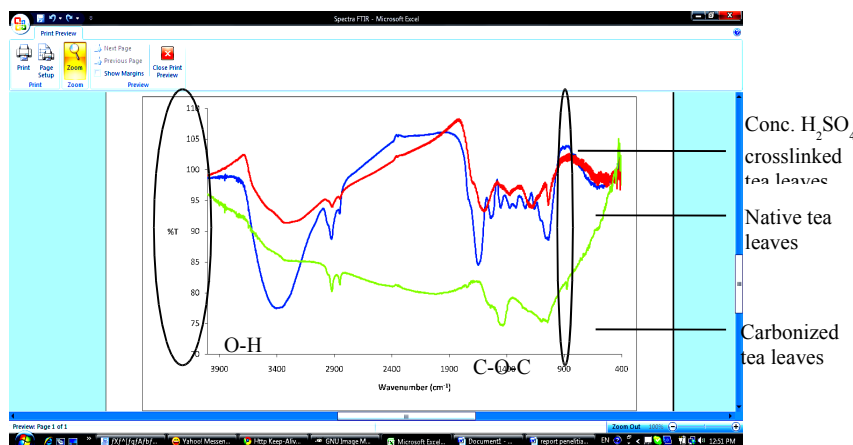
In order to identify the functional groups on conc. H_2SO_4 crosslinked tea leaves powder (CTL) and carbonized tea leaves (HTL), FTIR spectra presented in Fig. 1. In comparison between TL and CTL, the intensity of typical – OH stretch region near 3600-3000 cm^{-1} has decreased. The intensity at 1180 cm^{-1}, which is expected to be C-O-C, was increased indicating crosslinked occurs

Fig. 1. FTIR spectra of waste tea leave. TL: tea leaves, CTL: crosslink tea leaves, HTL: heated tea leaves
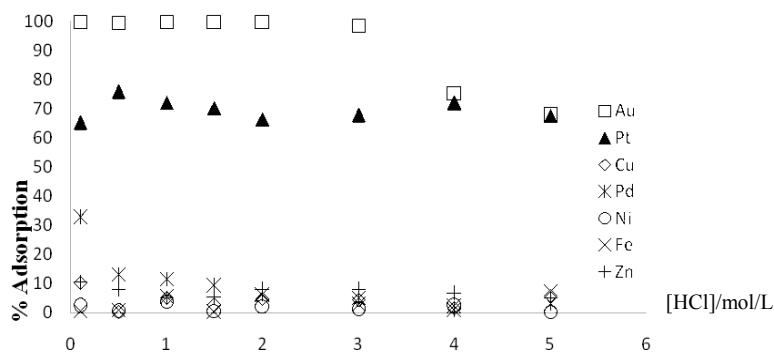
Fig. 2. Adsorption of various metal ions on CTL gels at varying hydrochloric acid concentration. Initial concentration of metal ions = 0.2 mM, weight of gel = 10 mg. Volume of test solution = 10 mL, temperature = 303 K, shaking time 48 h.

The adsorption behavior of the CTL gels for various metal ions at varying hydrochloric acid concentrations is shown in Fig. 2. It is clear that adsorption is observed not only for Au (III) but also for Pt(IV), and the CTL gels showed no affinity for base metals such as Pd(II), Cu(II), Zn(II), Fe(III), and Ni(II). This result indicates that the precious metals can be selectively separated from any other coexisting base metal ions in hydrochloric acid medium using the CTL gels. In addition, the % adsorption of the Au(III) metals decreased with increasing hydrochloric acid concentration.
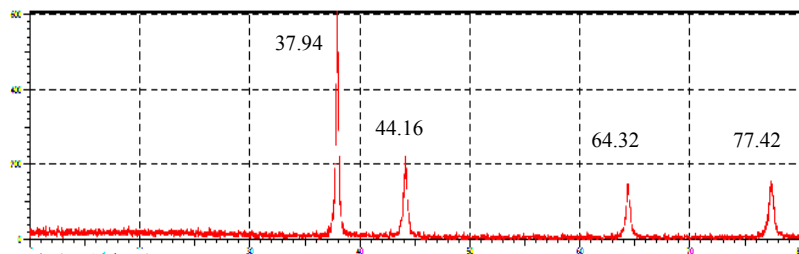
Figure 3. XRD pattern of crosslinked gel taken after adsorption

In order to confirm the reductive adsorption of gold, the XRD spectrum of the gel after adsorption of Au(III) was determined by means of X-Ray diffraction using XRD-610D Shimadzu X-ray deffractometer. As shown in Figure 3, sharp peaks are obserbed at around $2\theta = 38, 44, 64, 77$ for various gel, this proves that only Au(III) undergoes subsequent reduction after being adsorbed on various gel matrix.

Keywords: adsorption, gold, waste tea leaves

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

[1] Schiewer, S., Volesky, B., *Environ. Sci. Technol.,* 1996, 30, 2921-2927

[2] Kapoor, A., Viraraghavan, T., *Biores. Technol.,* 1997, 61, 221-227

[3] Xiong, Y., Adhikari, C.R., Kawakita, H., Ohto, K., Inoue, K., *Biores. Technol.* 2009, 100, 4083-4089

Laboratory-Assembled Automated Pretreatment System For Collection/ Preconcentration of Trace Metal Ions Using Chitosan-Based Chelating Resins

Akhmad Sabarudin[1,2]

[1] Department of Chemistry, Brawijaya University, Jl Veteran, Malang

[2] EcoTopia Science Institute, Nagoya University, Furo-Cho, Chikusa-Ku, Nagoya

Email address: sabarjpn@gmail.com

Abstract. *The laboratory-assembled automated pretreatment system (Auto-Pret System) was successfully designed in this work. The system was equipped with home-written operating program prepared by using Visual Basic programming software. The chitosan-based chelating resin, packed in a mini-column and utilized as an on-line preconcentration device, was installed to the Auto-Pret System coupled with spectroscopic detection. The system offered fully automated, easy operation and powerful analytical tool for separation, collection/concentration and determination of trace- and ultratrace- elements in environmental samples in a short time and accompanied with excellent detection limit. In comparison to the commercially available flow-based system, the Auto-Pret System is more robust, versatile, less reagent consumption and less waste production since the continuous flow system can be avoided. More importantly, the chitosan-based chelating resins developed in combination with the automated pretreatment system, satisfied the requirement for the improvement of selectivity, sensitivity, precision, accuracy, rapidity, and reproducibility in analytical chemistry.*

The developed chitosan-based chelating resins in this work provide better characteristics than those of commercially available, especially in term of adsorption kinetics, adsorption capacity, selectivity, as well as separation of matrix interferences. Some trace elements determined in the samples are Cr (VI), Cr (III), Pb, Cd, Ag, Be, Co, Cu, Ni, U, V, Mo, Hg, and rare earth elements (REEs).

Keywords: Automated Pretreatment, Chitosan, Chelating resins, Metal ions

Category: *Natural Sciences*

Presentation Media: Oral Presentation

References

[1] Sabarudin, A., Lenghor, N., Oshima, M., Hakim, L., Takayanagi, T., Gao, Y.-H., Motomizu, S. (2007). "Sequential-injection on-line preconcentration using chitosan resin functionalized with 2-amino-5-hydroxy benzoic acid for the determination of trace elements in environmental water samples by inductively coupled plasma-atomic emission spectrometry." *Talanta.,* 72 (5), 1609-1617

[2] Sabarudin, A., Oshima, M., Takayanagi, T., Hakim, L., Oshita, K., Gao, Y.-H., Motomizu, S. (2007). "Functionalization of chitosan with 3,4-dihydroxybenzoic acid for the adsorption/collection of uranium in water samples and its determination by inductively coupled plasma-mass spectrometry." *Anal. Chim. Acta.,* 581(2), 214-220.

[3] Sabarudin, A., Noguchi, O., Oshima, M., Higuchi, K., Motomizu, S. (2007). " Application of chitosan functionalized with 3,4-dihydroxy benzoic acid moiety for on-line preconcentration and determination of trace elements in water samples. " *Microchim. Acta.,* 159(3-4), 341-348.

[4] Sabarudin, A., Lenghor, N., Liping, Y., Furusho, Y., Motomizu, S. (2006). " Automated online preconcentration system for the determination of trace amounts of lead using Pb-selective resin and inductively coupled plasma-atomic emission spectrometry." *Spectrosc. Lett.,* 39(6), 669-682.
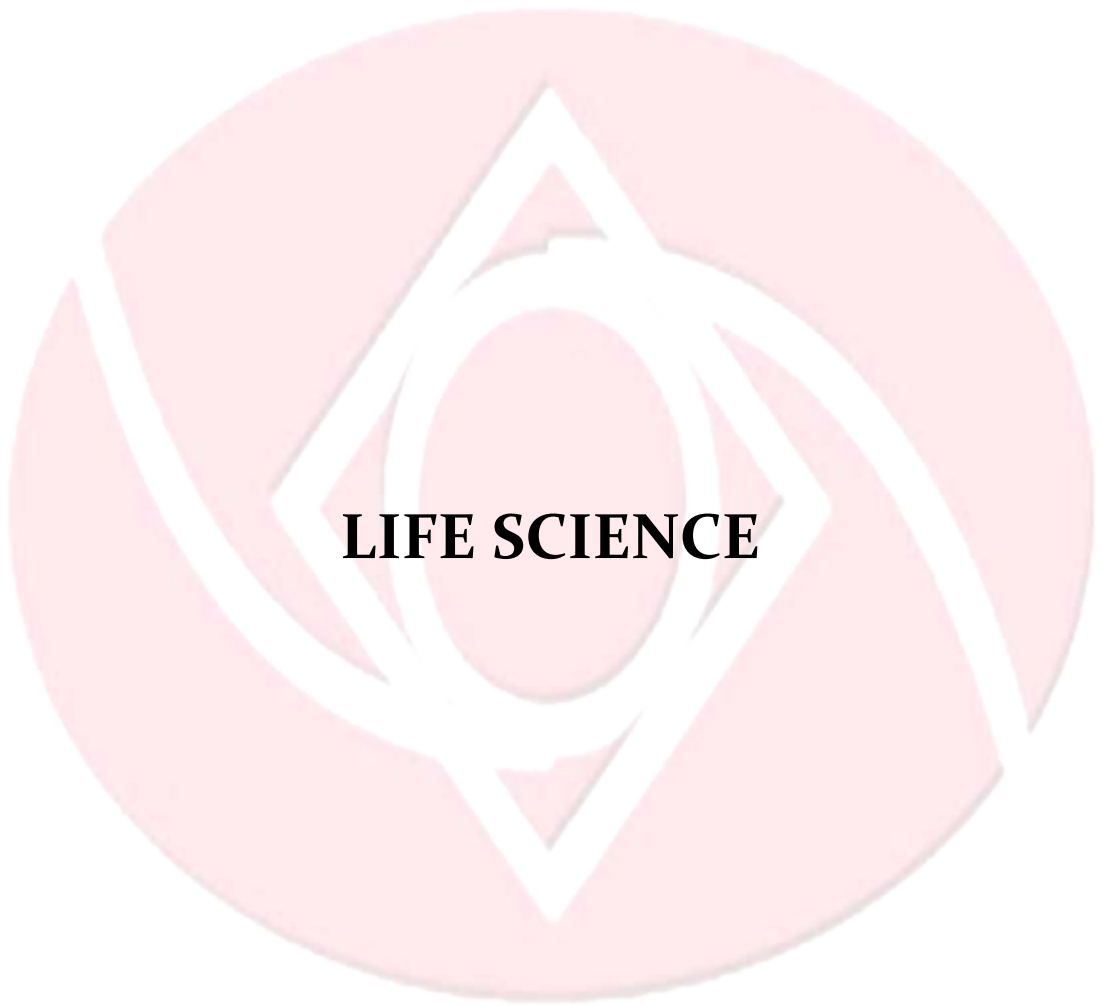
LIFE SCIENCE

Molecular Analysis of Rare Earth Cerium-Induced Methanol Dehydrogenase from *Bradyrhizobium* sp. CE-3

Nanung Agus Fitriyanto[1,2], Ambar Pertiwiningrum[2], Tomonori Iwama[1], Keiichi Kawai[1]

[1]Laboratory of Applied Microbiology, Faculty of Applied Biological Sciences, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan

[2]Department of Animal Product Technology, Faculty of Animal Science, Gadjah Mada University, Jl. Fauna No.3 Bulaksumur, Yogyakarta

Email address: n6103009@edu.gifu-u.ac.jp; nanungagusfitriyanto@yahoo.com

Abstract. *A group of 15 transition metals in group III of the periodic table are called lanthanoids or rare earth elements (REEs). However scandium (Sc) and Yttrium (Y) are included in the group of REE because chemical and toxicological characteristics of these two transition metals in group III appear to be very similar to those of REEs. Today, the possibilities of exposure to REEs are great. REEs have numerous roles in industry such as computers, plasma displays, hybrid cars. (1).*

Previously, most attention in heavy metal toxicology has been paid to cadmium, mercury, lead, chromium, nickel, and vanadium, because these metals widely polluted environments. However, with the development of new materials in the last decade, the need for studies the relation of REE in live organism has been increasing. Until now, the REEs have neither been characterized as essential elements for life, nor as strong toxic element in the environments. Several interactions between REEs and biological systems are known. Many studies in agricultural science suggested, indicated or even demonstrated that low concentrations of some REEs may promote growth and productivity of several crops. Application of this elements, either to the seed or to the crop biomass is nowdays widely practiced in agriculture in China, thus in a considerable part of earth's cultivated soils. The physiological and ecological mechanisms underlying their reactions have recently been given much attention. It has been reported that La, Ce, Pr and Nd can promote that root growth of coconut, corn and mungbean at low rate of application; high concentration of REEs in plants related to their high contents in soils. In contrast, high concentration of REEs may led to their scattering and bioaccumulation in the environmental pollution (2-3).

In the other hands, some negative effect of REEs in animal's body has been observed. Inhalational of intratracheal exposure of animals to REEs has been proven to cause acute pneumonitis with neutrophil infiltration in the lung. However, the mechanism of neutrophile recruitment or interaction of REE with lung cells has not been fully investigated (4).

In this study the relations between methanol dehydrogenase from strain microorganism and rare earth elements were investigated. An oligotrophic bacterium which isolated from soil in Mie prefecture, Japan, had been identified as Bradyrhizobium sp. CE-3. The growth of strain CE-3 was remarkably increased at 50 hours when this strain grown in the medium containing 0.5% methanol and 30 μM Ce. Enzyme activity was measured according to the method of Darren J.Day and Cristopher Anthony (5) and it was significantly increased when strain was cultivated with methanol and cerium. From the proteome analysis of this bacterium cultured with and without Ce, we found a protein appearance which increased more than 50 times with Ce. An open reading frame (ORF) for encoding methanol dehydrogense (MDH) large subunit-like protein of Bradyrhizobium sp. CE-3 was amplified. Sequence analysis revealed that the ORF encoding a putative 602 amino acid protein was closely related to mxaF' sequences of Bradyrhizobium japonicum USDA 110 (Identity; 93%), and the position of ribosome binding site was detected at 10 nt upstream from translation start site. Signal peptide was recognized in the upstream of MDH gene. Asn 24 – Asn 46 were found as set of amino acids confirmed by N-terminal sequencing of purified MDH. Bacterial quinoprotein dehydrogenase signature sequence was found at Trp 259 - Thr 276.

Escherichia coli DH5α was used for DNA manipulation and strain BL21 is for methanol dehydrogenase expression. Plasmid pUC19 (Takara) was used for DNA cloning and sequencing, and pET-29a (Novagen)

for the expression of MxaF' protein. Two oligonucleotide primers design based on sequences of known MxaF' gene were synthesized by Star Oligo RIKAKEN, Japan. Primer sequences are: CE3_KpnI-1F (forward primers), 5'- CAC<u>GGTACC</u>GATGCGCAAGTTGCTTTACGC-3' (the three bases are the protection bases, the underline show KpnI site); CE-3_EcoRI-1R (reverse primers), 5'- CAG<u>GAATTC</u>CTCACTGCTGCGGCAGCGAGA-3' (the three bases are the protection bases, the underline show EcoRI site).

Keywords: *Bradyrhizobium* sp. CE-3, methanol dehydrogenase, rare earth cerium

Category: *Life Sciences*

Presentation Media: Oral Presentation

References

[1]. **C.K.Gupta and N.Krisnsnamurthy.** Extractive Metallurgy of Rare Earths. CRC Press. Boca Raton London New York Washington, D. C. (2005).

[2]. **Zhang, F.-S, Yamasaki, S., and Kimura, K.:** Rare earth element content in various waste ashes and the potential risk to Japanese soils. Environment International. **27**(5), 393-398 (2001).

[3]. **Tyler, G.:** Rare earth elements in soil and plant systems - A review. Plant Soil. **267**(1), 191-206 (2004).

[4]. **Hirano, S. and Suzuki, K. T.:** Exposure, metabolism, and toxicity of rare earths and related compounds. Environ Health Perspect. **104 Suppl 1**, 85-95 (1996).

[5]. **Day, D. J. and Anthony, C.:** Methanol Dehydrogenase from *Methylobacterium extorquens* AM1. Methods in Enzymol. **188**, 210-216 (1990).

[6]. **Liu, Q., Kirchhoff, J. R., Faehnle, C. R., Viola, R. E., and Hudson, R. A.:** A rapid method for the purification of methanol dehydrogenase from Methylobacterium extorquens. Protein Expression and Purification. **46**(2), 316-320 (2006).

SOCIAL AND ECONOMIC SCIENCE

Regional Income Disparities in Indonesia

Recky H. E. Sendouw
Manado State University North Sulawesi, Indonesia
Email address: reckyhes@yahoo.com

Abstract. *By applying the coefficients of variation (CV's), Theil Index and the neoclassical concept of convergence this study examines regional income disparities, to check the existence of convergence across Indonesian provinces, and to identify the underlying factors of regional income growth rate in the period of 1993-1997 and 1997-2004. This study also examines the income disparities between Java and outer Java region in order to proof a popular belief that income disparities between those regions are wide and persistent.*

Regional income disparities decrease in the period 1993-1997, however, they reversely increase in the period of 1997-2004. The existence of conditional beta convergence implies in period 1993-1997 for both across Indonesian provinces and between Java and Outer Java region, but only exist between Java and outer Java region in the period 1997-2004. Educational attainment affects income growth rate in the whole period of study. The other factors, that are identified to affect income growth in the period of 1993-1997, are population, government expenditure and foreign direct investment, while population growth rate, export and domestic investment affect growth rate in the period of 1997-2004.

The results showed that regional income disparities across Indonesian provinces decrease in the period before Asian financial crisis, 1993-1997, however, they reversely increase in the period after Asian financial crisis, 1997-2004. Surprisingly, Theil Index decomposition showed that inter-regional income disparities between Java and outer Java region in both periods are very small. In other words, there are no significant income disparities between those regions. Thus, the problem is not between Java and Outer Java region disparities but the disparities between provinces both in Java and Outer Java region. The implication of these results, if the disparities across Indonesian provinces are decreasing than the total disparities between Java and outer Java regions should automatically decrease.

Keywords: Regional Development, Income Disparities, Theil Index

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References

Books

[1] Armstrong, H and Taylor, J. (2000). "Regional Economic and Policy". Third Edition. Blackwell Publishing, Oxford.

[2] Barro, R.J and Sala-i-martin, X. (2004). "Economic Growth". Second Edition. The MIT Press:London.

Journals

[3] Barro, R.J. (1991). "Economic Growth in a Cross Section of Countries". The Quarterly Journal of Economics. 106, 407-443.

[4] Fujita, M and Hu, D. (2001). "Regional Disparity in China 1985-1994: The effects of globalization and economics liberalization". Annal Regional Science. 35, 3-37.

[5] Garcia, J.G and Soelistianingsih, L. (1998). "Why do differences in provincial incomes persist in Indonesia?" Bulletin of Indonesian Economics Studies. 34 (1).95-120.

Export Competitiveness of Indonesia's Palm Oil Product in Europe

Amzul Rifin[1,2]

[1]**Department of Agricultural and Resource Economics, Graduate School of Agricultural and Life Sciences, The University of Tokyo**

[2]**Department of Agribusiness, Faculty of Economics and Management, Bogor Agricultural University**

Email: amzul_rifin@yahoo.com

Abstract. *Europe, especially Netherlands, has been a traditional market for Indonesia's palm oil product. Netherlands also serve as an entry point for Indonesia's palm oil product to enter other European countries market. The objective of this paper is to analyze the export competitiveness of Indonesia's palm oil product in Europe and analyze the cause of its competitiveness. Market share of Indonesia and Malaysia's palm oil product, crude palm oil and refined palm oil, will be calculated in 1999-2001 and 2005-2007. Constant market share analysis (CMSA) will be conducted to analyze the cause of changing market share (Tyszynski, 1951; Ongsritrakul and Hubbard, 1996).*

The results indicate that there is significant increase in European countries import of palm oil product. This increase is caused by four factors, increase in biodiesel demand, decrease in local vegetable oil production, increase demand in food industry and several countries serve as entry points.

In terms of market share, Indonesia's market share in refined palm oil increase from 18 percent in 1999-2001 to 30 percent in 2005-2007. Meanwhile for crude palm oil (CPO), it decreases from 38 percent to 36.7 percent. On the other hand, Malaysia's market share for CPO increases from 17 percent in 1999-2001 to 36 percent in 2005-2007. For refined palm oil, the country suffers a decrease in market share from 48 percent in 1999-2001 to 36 percent in 2005-2007.

From the CMSA shows that Indonesia loose its competitiveness in CPO meanwhile the increase in market share in refined palm oil is mainly cause by the increase in Indonesia's competitiveness. Meanwhile for Malaysia, the country benefited from Indonesia's loosing competitiveness in CPO by gaining more market share. On the other hand, in the refined palm oil the country looses its competitiveness to Indonesia.

In conclusion, European market for palm oil has increased significantly over the years. Indonesia gain market share in refined palm oil, meanwhile Malaysia increases its market share in crude palm oil. The increase in market share for Indonesia and Malaysia is mainly caused by the increase in demand as well as increase in competitiveness.

Keyword: palm oil, constant market share

Category: *Social and economic science*

Presentation Media: Oral presentation

Selected References:

[1] Ongsritrakul, S. & Hubbard, L. (1996).“The export market for Thai frozen shrimps in the European Union.” *Bri. Food J*., 98(8), 24-28.

[2] Tyszynski, H. (1951). “World trade in manufactired commodities, 1899-1950.” *The Manchester School*, 19(3), 272-304.

Should the Endogenous Poverty Line be Applied When Analyzing the Poverty Impact of Policy Reforms?

Teguh Dartanto[1]

[1] Graduate School of International Development, Nagoya University, Japan and LPEM FEUI, University of Indonesia

Email address: dartanto.teguh@a.mbox.nagoya-u.ac.jp

Abstract. *Policy reforms or economic shocks commonly have a large impact on household welfare through changing in price level and factors income. In a case of poverty, an increasing in price level will have double effects: 1) reduce purchasing power, and 2) increase poverty line. However, most of study on the poverty impact of policy reforms does not consider the second effect in which the poverty line is assumed to be fix, thus the poverty outcome of policy reforms might be underestimate and lead misleading in policy guidance. This research aims to theoretically and empirically prove the difference of poverty outcome between applying a fix and an endogenous poverty line.*

The theoretical study applies the theory of poverty, the Utility Maximization Problem (UMP)'s principle and the Expenditure Minimization Problem (EMP)'s principle. In addition, the empirical study utilized the Computable General Equilibrium (CGE)-Microsimulation and the endogenous poverty line. CGE is used to evaluate the impact of policy reforms (economic shocks) on price and factors income changes and Microsimulation is used to calculate the impact of price and factors income change on the household welfare and the poverty incidence. Lastly, the endogenous poverty line, in which the line will change following the change in price level in the economy, is applied to capture the second effect of price change.

According to the theoretical model and empirical estimations, this study has theoretically and empirically proven that, under the fix poverty line, the poverty impact of policy reforms (economic shocks) will always be underestimate. In addition, the poverty outcome of applying either the fix poverty line or endogenous poverty line will be same if the policy reforms (economics shocks) does not change price level in the economy. The empirical evidence clearly showed that applying the fix poverty line in analyzing the poverty impact of policy reforms (economic shocks) might provide biased policy guidance, i.e. under the fix poverty line, 60 % increase in the world price of soybean changes the poverty incidence by 0.09 %. Hence, due to a small impact on poverty, government might not take action responding to an increase in the world price of soybean. However, if the endogenous poverty line is applied, the poverty incidence will change by 0.29%. Then, government might actively intervene to stabilize the domestic price of soybean in order to reduce the bad effect of increasing in the world price. Therefore, this study suggested that in order to obtain a robust and unbiased conclusion, the endogenous poverty line should be applied.

Keywords: Poverty, Endogenous Poverty Line, Economic Modeling, Economic Development.

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References
Books

[1] Colell, Whinston, Green (1995) *Microeconomics Theory,* Oxford University Press, USA

Journals

[2] Dartanto, T (2009), *Measuring the Effectiveness of Fiscal Policies in Alleviating Poverty in Indonesia: A CGE-Microsimulation Analysis*, LPEM FEUI Staff Paper No.9.

[3] Decaluwé, L.B., Savard, L. and Thorbecke, E.(2005), General Equilibrium Approach for Poverty Analysis: With an Application to Cameroon, *African Development Review Volume 17 Issue 2, Page 213-243, September 2005.*

[4] Foster,J.E., Greer,J., and Thorbecke, E., (1984), A Class of Decomposable Poverty Measures, *Econometrica, 52, 761-776, 1984*

[5] Savard, L. (2003), *Poverty and Income Distribution in a CGE-Household Micro-Simulation Model: Top-Down/Bottom Up Approach*, CIRPEE Working Paper No. 03-43, October 2003.

インドネシア共和国西ジャワ州における家族酪農経営の規模拡大の可能性の評価

プラダナ　ムハマッド　ナスルル

東京農業大学大学院・農学研究科国際バイオビジネス学専攻

Email address: muhamad_2312@yahoo.co.jp

Abstract.

　本研究の目的は，インドネシア共和国における酪農の歴史的な発展動向，地域性，北バンドン酪農業協同組合の機能を整理するとともに，家族酪農経営の経営実態，飼養管理・飼料給与構造を解明し，その経営規模拡大の可能性について検討することにある。調査対象地域は，西ジャワ州・バンドン県・レンバン郡である。また，酪農経営の現在の経営課題と重要性・満足度に対する酪農家の評価特性を試みる。

　研究課題としては，次の４つを設定した。①酪農の歴史的な発展動向と地域性の解明，②牛乳加工システム，牛乳の流通経路の解明，③酪農経営の経営実態と規模拡大の可能性の評価，④インドネシアにおける酪農経営が抱える課題，現在の経営に対する満足度の評価。インドネシアにおける家族酪農経営の規模拡大を評価するため，規模別・経営タイプ別（小規模家族酪農経営，中規模家族酪農経営，大規模家族酪農経営）酪農家の粗飼料調達の実態，コスト・利益比率，経営収支（キャッシュ・フロー）を独自のシミュレーションモデルを開発して規模拡大の可能性を評価した。

　西ジャワ州を調査対象地域とした理由は，古くから酪農経営を行っている酪農家が多く，インドネシアを代表する酪農産地であるためである。家族酪農経営に関する実態調査は，６つの村（バルナグリ村，チベデュッグ村，チテスポン村，ナグラック村，パメチェラン村，パサル・ケミス村）を対象として行った。調査対象とした家族酪農家数は 57 戸であり，経営規模別に無作為に層化抽出した。規模別の調査農家数は，次の通りである。小規模家族酪農経営－24 戸，中規模家族酪農経営－30 戸，大規模家族酪農家－３戸である。

　主な研究成果としては，まず，酪農発展プロセスは３つに大きく分ける。①導入期オランダ殖民地の時代（19 世紀はじめから～1940 年），②破壊期（日本植民地の時代（殆どの乳牛会社や酪農場が破壊された），③再編期（インドネシア独立 1945 年 8 月 17 日・インドネシア政府の時代）である。次には，流通経路に関しては，酪農家から各村にある牛乳収集センターへ生乳を出荷する。牛乳収集センターでは，酪農協の従業員により生乳の品質チェックが行なわれる。続いて，チェックされた生乳はミルク缶で北バンドン酪農協まで出荷される。酪農協で牛乳を加工・管理し，加工された生乳は冷蔵トラックで大手乳業メーカーまで出荷する。

　また，最も酪農の規模拡大の問題とは，粗飼料生産基盤が脆弱である。特に，採草地までの距離が極端に遠く，毎日の草刈り労働に要する時間は，酪農家の大きな負担になっている。57 戸の酪農家の飼料調達の調査から，インドネシアの酪農家の次のような飼料調達の特徴が明らかになった。①調査したほとんどの酪農家は，配合飼料については酪農協（KPSBU）に注文して調達しているが，キャッサバや豆腐等のカス，乾草，その他飼料については，いずれも仲買人を通して購入している。②専用の粗飼料生産基盤を保有する酪農家の割合は大規模 100%，中規模 67%，小規模 50%であり，粗飼料生産基盤を持たない酪農家が小規模，中規模ではかなり存在することが明らかになった。③自給飼料として生産されているのは，ルンプット・ガジャーと呼ばれる生産力の牧草であり，主として畑で生産され，生草で乳牛に給与されている。なお，生草の刈取りは毎日鎌を用いて手作業で行われる。④ほとんどの酪農家は粗飼料生産基盤が脆弱であるため，野草を収集せざるをえない。野草の収集作業は，毎日朝から夕方まで，様々な場所で実施されている。また，採草場所も家から離れた場所が多く，大きな労働負担となっている。

　次には，経営規模拡大の可能性に関するシミュレーションの結果，次の事が明らかになった。①経産牛４頭から 12 頭規模に達するまでに要する期間は７年間とかなり長いことが明らかになった。②この期間を短くするためには，受胎率の向上と粗飼料生産基盤の確保が必要である。③収入費用比率>１と収益・コスト比率>０であり，持続的な家族酪農経営の展開が可能である。

　収入費用比率は，1.45 である。意味は１ルピアを投資すると，1.45 ルピアの利益が得られる。さらに，売上高と投資コストの価格の変動を確認するため，感度分析を行った。その結果，投資コストが 60.3%まで上がっても，酪農経営の持続が可能である。すなわち，生乳の価格が 2,583 ルピアまで下がっても，酪農家がまだ生き残れることが明らかにした。

　投資資金の回収可能性を PV-CUMULATIVE で評価した。その結果，９年目にすべて投資した資金の回収が可能であることが明らかになった。経営規模拡大の可能性をシミュレーションした結果，次の事が明らかになった。経産牛３頭から 12 頭規模にするまでに要する期間は８年間とかなり長いことが明らかになった。この期間を短くするためには，受胎率の向上と粗飼料生産基盤の確保が必要である。正味現在価値（Net Present Value）は 41,728,865 ルピアであり，内部収益率（IRR）は 9.79%である。収入費用比率>１と収益コスト比率>０となり，持続的な家族酪農経営の展開が可能であることを示している。

　また，酪農協を中心とした酪農家支援対策の重要度，満足度を評価した結果，「酪農協の能力やサービス」「酪農協の普及員の活動」「牛乳代金の支払い」等の酪農協のサービスの重要度と，満足度は高いことが明らかになった。一方，「メーカーの牛乳買い取り価格」，「酪農の経営や技術の指導」，「配合飼料価格」，「酪農協による農家の経営問題解決支援」，「地方政府の支援や補助金」，「農家の福祉対策」については，重要性が高いにもかかわらず，十分な対策が実践されていないと評価されていることが明らかになった。

Keywords: 収益コスト比率，PV-CUMULATIVE，正味現在価値（NPV），内部収益率（IRR）

Category: *Social and Economic Sciences*

Presentation Media: Oral Presentation

Expenditure Efficiency and the Optimal Size of Government in Developing Countries

Yogi Rahmayanti[1], Theara Horn[2]

[1] Osaka School of International Public Policy, Osaka University, 1-31 Machikaneyama, Toyonaka, Osaka 560-0043 Japan;

Email address: y-rahmayanti@osipp.osaka-u.ac.jp

[2] Graduate School of Economics, Osaka University, 1-7 Machikaneyama, Toyonaka, Osaka, 560-0043, Japan;

E-mail address: hge016ht@mail2.econ.osaka-u.ac.jp;

Abstract. *Government efficiency plays a significant role in the relationship between government expenditure and economic growth. Based on panel data from 63 developing countries 1990 to 2003, we calculate efficiency scores using Data Envelopment Analysis, incorporate them into a simple model of growth with government expenditure. We find that there is a critical level of efficiency required for government expenditure to have positive effect on growth. Further, above a critical level of efficiency, greater efficiency lowers the optimal size of government expenditure required to maximize growth.*

Our study presents a novel contribution in which we combine together both issues of efficiency and optimal size, which were separately considered in previous studies, to explain the relationship between government expenditure and economic growth. First we incorporate the efficiency score into estimation models with government expenditure size to show the role of efficiency in the relationship of government spending and economic growth. Second, we find the optimal size of government expenditure by considering not only the government expenditure, but also the efficiency score.

There are two main differences between our work and the previous study by Angelopoulos et al. (2008). First, although we study the same research question to find the effect of efficiency in the relationship between government size and economic growth, we use different method of efficiency measurement and a different set of data. We use Data Envelopment Analysis (DEA) method to calculate efficiency. Since the specific production function is hard to define for the public sector, employing the DEA method is favorable, as it does not require the specification of the production function. In terms of data, this study takes into account only the developing countries in order to avoid the possibility of unreliable benchmarking due to the different characteristics between developed and developing countries. Second, we extend the research question beyond that of Angelopoulos et al. (2008) by estimating the effect of efficiency on optimal size of government expenditure to maximize economic growth.

Our study comes to two main conclusions. First, supporting the result of Angelopoulos et al. (2008) we find a significant effect of efficiency on the relationship between government size and growth, in this case for developing countries. We conclude a similar pattern that the effect of government size on growth becomes positive only after the efficiency level reaches a certain threshold. Second, we find that efficiency also has a significant role in explaining the relationship between the optimal size of government expenditure and growth. Above a certain efficiency threshold, increasing efficiency will reduce the size of government expenditure required to maximize growth. Based on these conclusions, to maximize the economic growth, governments of developing countries should pay attention on both the size of their government expenditure and the efficiency of their spending.

Keywords: Fiscal Policy, Government Expenditure, Public Sector Efficiency, Economic Growth.

Category: *Social and Economic Sciences*

Presentation Media: Oral Presentation

Selected References

Books

[1] Wooldridge, J.M. (2002), "Introductory to Econometrics: A Modern Approach Second Edition", USA: South Western.

Journals

[2] Afonso, A., Schuknecht, L., Tanzi, V. (2003), "Public Sector Efficiency: an International Comparison", *European Central Bank Working Paper Series,* No. 242.

[3] Angelopoulos, K., Philippopoulos, A., Tsionas, E. (2008), "Does public sector efficiency matter? Revisiting the Relation between Fiscal Size and Economic Growth in a World Sample", *Journal of Public Choice,* Vol. 137, p. 245-278.

[4] Barro, R.J. (1990), "Government Spending in A Simple Model of Endogenous Growth", *The Journal of Political Economy,* Vol. 98, No. 5, p. 103–125.

A Three Dimensional Kinematics Analysis of the Standing and Jumping Smash Strokes in Badminton

Agus Rusdiana[1]

[1]Graduate School of Health and Sport Sciences, Chukyo University - Japan

E-mail address: rusdiana.agus@yahoo.com

Abstract. *Among various badminton strokes, the forehand overhead smash is one of the most powerful strokes. Shuttle speed of the top player's smash may exceed 300km/h, and it is almost the fastest in all sports activities. The smash stroke is divided into two types, namely standing smash and jumping smash. Even so, more than half of the racket-head speed depends on the proximal part of the body, such as trunk and legs. The movement of the forearm and hand not only produce a great velocity of racket head by its rotation but also transmit the energy produced in the proximal part of the body to racket head. In many striking and throwing skills, importance of the power production in the proximal larger part of the body has been emphasized, and ground reaction force was often recorded and analyzed to clarify the role for the faster speed of the equipment and the ball. However, players cannot fully use the power from the legs in jumping smash, because they do not contact with ground during the acceleration phase of the racket. These should be some special acceleration techniques of the racket in jumping smash. The purpose of this study is to analyze the biomechanical kinematic variables (shuttle and racket speed, joint angle and angular velocities) for the forehand overhead smash strokes between jumping smash and standing smash in Badminton.*

The subject in this study was two male players of Chukyo University badminton club activity. This study is use three-dimensional (3D) high speed video camera analysis. The other instrument require of this study are three-dimension calibration frame, force plat form, marker point, motion analysis (FRAME DIAZ 4), and sport badminton equipment. The joints angle analysis of upper limb segment (shoulder, elbow, radio-ulnar and wrist joints) of the smash stroke was using of the Sakurai et al method (1989). To determine of the joint angle definition of the upper extremity: (1). Adduction / Abduction at shoulder joint. (2). Horizontal Adduction / Abduction at shoulder joint. (3). Internal / External Rotation at shoulder joint. (4). Extension / Flexion at elbow joint. (5). Pronation / Supination at radio-ulnar joint. (6). Ulnar / Radial Flexion at wrist joint. (7). Palmar / Dorsi Fkexion at wrist joint.

Indonesian Government Debt Management: Achieving Debt Sustainability and Optimal Debt Portfolio

Malul Azam

Graduate School of Management, Ritsumeikan Asia Pacific University

Email address: malulazam@gmail.com

Abstract. *Indonesian government debt strategy has shifted from relying on external debt to domestic debt. Triggered by the Asian crisis in 1997-1998, the government has issued enormous amount of domestic debt for the first time. Regrettably, due to the absence of appropriate preparation and sequencing on the issuance process, the government could not design sound structure cost and risks of the debt. Policy makers have challenging task to improve poor structure and deficiency of the debt, since aftermath, the government will continuously take benefit from domestic debt instruments. Actually, the choice between external and domestic debt financing is not straightforward decision. Each strategy may accentuate both desirable and undesirable impacts, particularly for emerging countries such as Indonesia. On the basis of the above description, this study intends to analyze important factors of Indonesia debt strategy shifting from relying more on external debt to domestic debt after the crisis. The study also covers analysis on implications of the current Indonesia debt strategy towards debt sustainability development and attempt to find optimal debt portfolio.*

Three different approaches are employed to solve the problems. Qualitative analysis was performed to study important factors which caused Indonesia debt strategy shifting from external to domestic debt after the crisis. All these factors are searched mainly from the literature review and confirmed with Indonesia's data. Trend analysis was applied to compare debt sustainability indicators before and after implementation of the strategy. Comparison was undertaken in terms of debt solvability and solvency indicators as important signal of debt sustainability. The study on implications of shifting strategy is strengthened with asset liability management analysis. Portfolio analysis was conducted by employing debt simulation on costs and risks of debt instruments to find optimal debt portfolio.

From the analysis, we can understand that preconditions to issue domestic debt securities actually have existed after the crisis due to buoyant market capacity as a result of financial market deregulation in 1987. These preconditions were fostered by narrowing parity cost between external and domestic debt financing instrument which make domestic debt more attractive. Government debt sustainability indicators after the Asian crisis depict positive trends. Fiscal consolidation followed with fiscal stimulus by maintaining primary budget surplus and budget deficit below three percent has steadily reduced the debt burden. Flexibility of domestic debt instruments could reduce complication of the government effort in re-profiling and restructuring process of debt. Moreover, domestic debt gives more flexibility for the government to manage its debt structure and be able to discipline government not to owe extensively. Shifting to domestic debt align with future cash flow of Indonesia revenue which could not rely more on oil export revenue as its main source of foreign currency revenue.

Although domestic debt incurs more expensive debt cost, it offers lower risk. The shifting from external to domestic debt has changed Indonesia debt structure from lower interest rate to higher interest rate. Calculation of cost and risk for the past five years shows, on average, that external debt offers lower debt cost compared to domestic debt. From the simulation employed, under normal economic environment, higher external debt share in the portfolio will lower government debt cost. However, excessive reliance on external debt could trigger vulnerability of exchange rate fluctuations. The debt simulation, given crisis scenario, showed that reliance on domestic debt bears lower debt cost for government.

Keywords: external debt, domestic debt, debt sustainability, debt management, optimal debt portfolio

Category: *Social and economic science*

Presentation Media: Oral presentation

Selected References:

Books

[1] Missale, A. (2000). *Public Debt Management*. Oxford University Press.
[2] Wheeler, G. (2004). *Sound Practice in Public Debt Management*. Washington: World Bank.

Journals

[3] Gray, S. and Woo, D. 2000. "Reconsidering External Financing of Domestic Budget Deficits: Debunking of Some Received Wisdom." *IMF Policy Discussion Paper* PDP/00/8.
[4] Hanson, James A. (2007). "The Growth in Government Domestic Debt: Changing Burdens and Risks." *World Bank Policy Research Working Paper* 4348.
[5] Mehl, A. and Reynaud, J. (2010). "Risky public domestic debt composition in emerging economies." *Journal of International Money and Finance*, Vol. 29 No.1, 1—18.

The Role of Ownership and Corporate Governance on the Performance of Privatized State-Owned Enterprises: a Study about Partial Privatization

Fauzi, Akhmad

Ritsumeikan APU

AP House 1 E.319 Jumonjibaru 1-1 Beppu, Oita

Email Address: Akhmfa08@apu.ac.jp

Abstract. *State control over enterprises is not always inferior compare to private, as long as the state can ensure the implementation of good corporate governance in the enterprises. The best practice to ensure State-Owned Enterprises implement the good corporate governance is by privatization. It will induce State-Owned Enterprises to manage various interests among parties within company successfully to end up with companies' optimum performance.*

Indonesian Government has chosen to privatize some of their State-Owned Enterprises. However, the government still keeps their majority ownership over the enterprises by privatizes them partially. Based on this fact, a question is raised on whether or not partial privatization can improve the State-Owned Enterprises. Another question is about whether or not the privatized State-Owned Enterprises can perform as well as private firms, regarding their social welfare burden which makes them difficult to achieve an optimum performance.

By utilizing regression model, we find that the state majority ownership over enterprises affects positively to company's performance. Our finding proves that without transferring the state majority ownership, State-Owned Enterprises can perform as well as private firms. The result on that model also shows that dominant foreign commissioner and director, Initial Public Offering (IPO), market share and committee establishment variables affect positively to the performance of the firms. On the other hand, dominant independent commissioner variable affects negatively to the performance of the firms. The result of committee establishment variable is critical, since the establishment of committees is objected to ensure good corporate governance in the companies. Subsequently, by comparing between the pre-privatization and post-privatization performance, we have proved the improvement of the State-Owned Enterprises' performance after privatization. We simultaneously analyze the trend of State-Owned Enterprises' performance after privatization. Majority of privatized State-Owned Enterprises shows an outstanding performance trend. They show an increasing and steady trend of performance.

Finally, by performing case studies on the unsuccessful privatized State-Owned Enterprises, we reveal the reasons of their failures. Two main reasons of their under-performance results are rooted on the cost efficiency and sales. They cannot produce with an efficient cost which is shown by their low profit margin and high ratio of cost of goods sold on sales. They also cannot compete well in the industry which is shown by their fluctuated growth sales. These finding support the previous finding about corporate governance. Their failures mean that they fail to implement good corporate governance. They do not succeed to induce management to conduct on behalf of shareholder's profit maximization. On the other hand, the owner also fails to construct an efficient control over their management.

In Summary, we prove that without transferring the state majority ownership, privatized State-Owned Enterprises can perform as well as private firms. This finding becomes an essential support for Indonesian Government to continue their option to privatize their State-Owned Enterprises. Moreover, we claim that the partial privatization is a dependable method to improve the State-Owned Enterprises' performance.

Keywords: privatization, ownership, corporate governance.

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References

Books

[1] Berle, Adolf A., Means, Gardiner C. 2003, The Modern Corporation and Private   Property, Commerce Clearing House, New York.

Journals

[2] Goldeng, Eskil., Grunfeld, Leo A., Benito, Gabriel R.G. 2008, The Performance Differential between Private and State Owned Enterprises: The Roles of   Ownership, Management and Market Structure; *Journal of Management Studies*, pp. 1244- 1273.

[3] Frech III H E. 1976, The Property Right Theory of the Firm: Empirical Results from a Natural Experiment, *Journal of Political Economy*, Volume 84, Number 1, pp.143-152.

[4] Klapper, Leora F., Love, I. 2004, Corporate Governance, Investor Protection, and Performance in Emerging Markets, *Journal of Corporate Finance*,   pp.703-728.

[5] Dharwadkar,R., George, G., Brandes, P. 2000, Privatization in Emerging   Economies: An Agency Theory Perspective, *The Academy of   Management Review*, Volume 25 Number 3.pp-650-669.

Assessing the Level of Competitiveness of Indonesian Accounting Standards

Lasmin

Ritsumeikan Asia Pacific University, Beppu, Japan

Email address: la10@apu.ac.jp

Abstract. *International Financial Reporting Standards (IFRS) has gained its currency and became a legitimate-global set of and a yardstick of competitive accounting standards in the last two decades. As of January 2007, 117 countries has either adopted or permitted the use of IFRS in their jurisdictions. Since 1994, Indonesia has tried to harmonize Indonesian Accounting Standards (PSAK) with IFRS, resulted in a situation where PSAK eventually comprises of IFRS, US GAAP and originally created Indonesian Standards in single pronouncement. This makes it clear that the results of the efforts to improve the level of competitiveness of PSAK by harmonizing PSAK with IFRS remain in question.*

Current study empirically examines whether the efforts to harmonize Indonesian Accounting Standards (PSAK) with International Financial Reporting Standards (IFRS) have been successful. The aims of the study are to measure the extent and progress of formal harmonization, which is harmonization in accounting regulations that comprise 2003, 2007 PSAK, and 2007 IFRS. Formal harmonization is measured by assessing 43 accounting methods of 18 accounting standards of 2007 IFRS and their corresponding standards in 2003 and 2007 PSAK, using Jaccard's Coefficient, Spearman's Correlation Coefficient, Euclidean Distance, and Chi-square. Generally, current study found that the extents of formal harmonization are high, although some divergences still occur.

The results of this study should assist regulators and researchers in comprehending the position of formal of Indonesian Accounting Standards. The International Accounting Standards Board (IASB) will be interested in this study because there are only few empirical studies on formal of developing countries, especially on Indonesia. The board needs to make certain that its third objective, which is promoting convergence between national accounting standards and IFRS, has been accomplished in developing countries. It also can use the results of this study to better comprehend the extent of harmonization of IFRS among developing economies so that IASB can devise suitable strategies and apt accounting standards. For standards-setting bodies in Indonesia and other developing countries, this study will provide vivid pictures of the positions and improvement of formal harmonization of national accounting standards with IFRS. Finally, this study should guide investors and other participants in Indonesian financial market in assessing the level of Indonesian accounting quality. If the findings are favorable, they will restore investors confidence on Indonesian companies' financial reporting and if they are not, the participants can benefit from lower cost of collecting relevant information by noticeably understanding which part of financial statements that must be adjusted and which part that can be remained.

Keywords: accounting standards, international accounting, formal harmonization.

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References

Journals

[1] Fontes, Rodrigues, and Craig. (2005). "Measuring Convergence of National Accounting Standards with International Financial Reporting Standards." *Accounting Forum.*, 29, 415–436.

[2] Garrido, Leon, and Zorio. (2002). "Measurement of Formal Harmonization Process: The IASC Experience," *The International Journal of Accounting.*, 37, 1–26.

[3] Rahman, Perera, and Ganeshanandam. (1996). "Measurement of Formal Harmonisation in Accounting: An Exploratory Study," *Accounting and Business Research.*, 26(4), 325–339.

[4] van der Tas, L.G. (1988). "Measuring Harmonisation of Financial Reporting Practice," *Accounting and Business Research.*, 18(70), 157–189.

[5] Tay, and Parker. (1990). "Measuring International Harmonization and Standardization," *Abacus.*, 26(1), 71–88.

Property Regime Structure, Environmental Change and the Raising Social Grievances: How Oil Palm Expansion in Indonesia Affects the Livelihoods of Forest-Dependent People

Maharani Hapsari[1]

[1] Department of International Relations, Faculty of Social and Political Science, Gadjah Mada University

Email address: ranikumoro@yahoo.com

Abstract. *This study explores the linkages between the changing structures of property regime in the oil palm plantation sub sector and the raising social grievances at the community level. More specifically, it investigates the role of government intervention in mediating the impacts of ecological change on the livelihoods of forest-dependent people, especially those who are excluded from access and withdrawal rights as far as the value of forest resources is concerned. Through literature review and fieldwork in West Kalimantan Province, this study found that the most important form of government intervention is altering the property rights from the state to private companies as well as smallholders. By enacting policies that enable investors to utilize agricultural land and additional forest land for new plantation area, large scale oil palm expansion has so far been successfully promoted.*

Alongside the changing structure of property regime, social grievances that concerns with the fate of forest-dependent people have intensified. Unabated problem is attributed to some factors. First, during the transfer of property rights, the government has failed to provide sufficient protection in order to address the loss of forest dependent people's sources of livelihoods. This is evident when they were expelled from their land during the establishment of new plantations. As a result, oil palm expansion has exacerbated the feeling of insecurity among the forest-dependent people and created social tensions between local people and plantation companies. What is more, it highlights some flaws in realizing social justice when the rights of forest dependent peoples are not well accommodated by current institutions. Second, the government has failed to ensure that plantation owners are credible in terms of demonstrating their capacity to increase the value of the land that has been allocated for plantation. As a result, even though large areas of forest have been converted for the purpose of plantation, it does not bring significant improvement on people's quality of livelihoods. This study provides valuable lesson that in the process of transfer of property rights, both the efficiency of resource use with reference to ecological sustainability and social justice with regards to the equality of rights of the forest-dependent people needs to be addressed in order to avoid undesirable social and ecological impacts of natural resources use.

Keywords: natural resources, property regime, environmental change, social grievances, oil palm, Indonesia

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References

Books

[1] Colchester, M., Jiwan, N., Sirait, M., Firdaus, A. Y., Surambo, A., & Pane, H. (2006). *Promised land: Palm oil and land acquisition in Indonesia – Implications for local communities and indigenous peoples.* Bogor: Forest Peoples Programme, Sawit Watch, HuMA, World Agroforestry Center.

[2] Conca, K., & Lipschutz, R. D. (1993). *The state and social power in the global environmental politics.* New York: Columbia University Press.

[3] Cotula, L., Dyer, N., & Vermeulen, S. (2008). *Fuelling exclusion? The biofuels boom and poor people's access to land.* London: IIED.

Journals

[4] Bromley, D. W. (1992). The Commons, common property and environmental policy. *Environmental and Resource Economics 2* , 1-17.

Zakat sebagai Kredit Pajak

Hani Rahmat Budi Norkusuma

Graduate School of International Development, Nagoya University, Japan

E-mail: hani.norkusuma@yahoo.com

Abstract. *Zakat merupakan salah satu ibadah wajib bagi umat Islam yang dikumpulkan dari orang-orang mampu dan disalurkan untuk orang-orang yang tidak mampu seperti orang-orang fakir dan miskin. Jumlah penduduk yang beragama Islam di Indonesia mencapai lebih dari 88 persen atau sekitar 193 juta jiwa[1], sehingga terdapat potensi pengelolaan zakat yang sangat besar, baik dalam hal pengumpulan zakat maupun dalam hal penyaluran zakat. Saat ini pengelolaan zakat di Indonesia diatur di dalam Undang-undang Nomor 38 Tahun 1999 tentang Pengelolaan Zakat (UU Pengelolaan Zakat)[2].*

Salah satu insentif untuk menggiatkan sektor zakat, sebagaimana disebutkan dalam Undang-undang Pengelolaan Zakat[2] dan Undang-undang Pajak Penghasilan adalah bahwa zakat yang dibayarkan kepada badan amil zakat (BAZ) milik pemerintah atau lembaga amil zakat (LAZ) milik swasta yang disahkan oleh pemerintah boleh dikurangkan dari penghasilan kena pajak[3]. Dalam praktiknya sampai sekarang, zakat sebagai pengurang penghasilan kena pajak, belum memberikan dampak yang signifikan. Komisi VIII DPR RI berencana merevisi UU Pengelolaan Zakat dan telah meminta Badan Amil Zakat Nasional (BAZNAS) untuk memberi masukan terkait dengan usulan RUU Pengelolaan Zakat. Salah satu materi pokok perubahan yang diusulkan oleh BAZNAS adalah menjadikan zakat sebagi kredit pajak[4].

Makalah ini bertujuan untuk menelaah dampak kebijakan zakat sebagai kredit pajak, dengan menggunakan metode analisis deskriptif. Dari hasil pembahasan, jika sistem pembayaran zakat masih sama seperti sekarang, dimana zakat dibayarkan kepada BAZ milik pemerintah atau kepada LAZ milik swasta, maka penerapan zakat sebagai kredit pajak akan mengganggu keuangan negara karena akan mengurangi penerimaan negara dari sektor pajak, menambah biaya administrasi dan akan menimbulkan kecemburuan dari pemeluk agama lain. Agar hal-hal tersebut tidak terjadi, sebaiknya zakat sebagai kredit pajak dilaksanakan dengan cara: (1) Zakat yang dapat dikreditkan (dikurangkan) dalam pembayaran pajak adalah zakat atas penghasilan wajib pajak (WP) yang telah mempunyai Nomor Pokok Wajib Pajak (NPWP), berupa uang yang dibayarkan ke kas negara (masuk ke rekening pemerintah sehingga masuk ke APBN). (2) Sistem pembayaran zakat dibuat sama dengan sistem pembayaran pajak, dimana WP membayar sendiri zakatnya ke bank atau kantor pos dengan menggunakan formulir semacam surat setoran pajak (SSP) yang kode pembayarannya dibuat khusus kode pembayaran untuk zakat, dan WP melaporkan sendiri bukti pembayaran zakatnya ke Kantor Pelayanan Pajak (KPP). (3) Dibuat pos atau mata anggaran khusus di APBN untuk penerimaan negara dari zakat, sehingga dapat diketahui jumlah zakat yang terkumpul, dan pengeluaran/belanja pemerintah untuk penyaluran zakat yang bisa diintegrasikan dengan program pengentasan/penanggulangan kemiskinan. (4) Untuk tata cara penyaluran zakat perlu diatur lebih detil karena perlu mempertimbangkan fiqh penyaluran zakat, kerahasiaan data perpajakan dan dana bagi hasil dengan daerah.

Dengan cara tersebut, pemerintah tidak perlu khawatir keuangan negara akan terganggu. Kebijakan zakat sebagai kredit pajak bisa menjadi insentif yang menarik bagi perekonomian

Indonesia apalagi ketika perusahaan-perusahaan yang berbasis syariah semakin banyak. Agar zakat sebagai kredit pajak ini bisa dilaksanakan sesuai yang diharapkan, perlu pembahasan mendalam terutama untuk merevisi UU Pengelolaan Zakat dan aturan pelaksanaannya, UU PPh dan aturan pelaksanaannya serta UU APBN.

Kata kunci: zakat, undang-undang pengelolaan zakat, kredit pajak, pajak penghasilan

Kategori: *Social and Economic Science*

Media Presentasi: Presentasi oral

Daftar Pustaka

[1] Kementrian Agama Republik Indonesia (2008). Data penduduk menurut agama.
URL: http://www.kemenag.go.id/file/dokumen/Data0801.pdf . Diakses tanggal 17 juli 2010.

[2] Undang-undang Nomor 38 Tahun 1999 tentang Pengelolaan Zakat.
URL: http://www.bpkp.go.id/unit/hukum/uu/1999/38-99.pdf . Diakses tanggal 17 juli 2010.

[3] Undang-undang Nomor 7 Tahun 1983 tentang Pajak Penghasilan sebagaimana telah dirubah terakhir dengan Undang-undang Nomor 36 Tahun 2008.
URL: http://www.ortax.org/ortax/?mod=aturan&page=show&id=13430 . Diakses tanggal 17 juli 2010.

[4] Hafidhuddin D. (2010). Usulan BAZNAS Atas Konsep RUU Pengelolaan Zakat.
URL: http://www.forumzakat.net/index.php?act=viewartikel&id=66 . Diakses tanggal 17 juli 2010.

Political Parties and Religious Local Ordinances in Post-Suharto Indonesia

Iqra Anugrah

College of Asia Pacific Studies, Ritsumeikan Asia Pacific University, Beppu, Japan

Email: anugiq07@apu.ac.jp

Abstract. *Political parties have played an important role in Indonesia since the early days of independence. Freer political setting at local and regional level has provided more freedom for local politics and political party. Consequently, the increasing role of political parties after political and electoral reformation in Indonesia has given political parties even greater role than before. This change in politics accordingly has brought impacts to political spectrum of Indonesia. Though the old political setting and party dominance of Soeharto era has already collapsed, classical socio-political division of Santri (observant Muslims) and Abangan (nominal Muslims, secularists and minorities) is still clearly reflected in the dichotomy of Islamic-secular parties. While the division is now less ideological in daily life, thanks to the moderate shift of political Islam and Islamic political parties and the significant level of political secularization among Indonesian Muslims, it still operates in politics, where values may be interpreted differently. The rise of religious local ordinances (perda syariah) is one of the most obvious examples of the difference of values and expectations in Indonesian politics.*

This phenomenon, although looks relatively current, has actually rooted in the early stage of nation building, confirmed by the debates on the philosophical foundation and the inclusion of Islamic values in the constitution. The modern manifestation of religious local ordinances can be found in the form of 'anti-vice' regulations in numerous regions in Indonesia. While the trend of religious local ordinances has been prevalent, the difference of political parties' official stance towards the issue and the gap between elite interest and public opinion remain as an unanswered question.

Much research has been done in analyzing political culture and Sharia implementation in Indonesia. However, most of these studies focus more on other socio-political factors outside formal electoral and political procedures. Hence, this study tries to propose another perspective by examining the rise of religious local ordinances in post-Soeharto era and its relationship with electoral and political party reforms in Indonesia. Particularly, this study will focus on the dynamics of political part in influencing the implementation of religious local ordinances and its impact on current political landscape and development. Furthermore, it will examine the reasons behind the support for religious local ordinances and what factors contribute to the rise of religious local ordinances. Previous studies that showed bias between elite and public opinion in the issue of religious local ordinances as well as contemporary political spectrum of post-reform Indonesia will be used as the theoretical framework. Thus, this study aims to analyze this phenomenon in order to find out major challenges in Indonesia's democratization.

Keywords: Political Parties, Religious Local Ordinances, Democratization, Post-Suharto Indonesia

Category: *Social and Economic Science*

Presentation Media: *Oral Presentation*

Selected References

Books

[1] Ali-Fauzi, Ihsan, & Mujani, Saiful. (2009). *Gerakan Kebebasan Sipil: Studi dan Advokasi Kritis atas Perda Syariah (Civil Liberty Movement: Studies and Critiques on Sharia-based Legislations)*. Jakarta: Freedom Institute.

[2] Bush, R. (2008). *Regional Sharia Regulations in Indonesia: Anomaly or Symptom?*. In Fealy, G., & White, S. (Eds.), *Expressing Islam: Religious Life and Politics in Indonesia* (pp. 174-191). Singapore: ISEAS.

[3] Geertz, Clifford. (1976). *The Religion of Java*. Chicago: The University of Chicago Press.

Journals

[4] Asi, Rohaiza A. (2007). "Sulawesi: Aspirations of Local Muslim". *RSIS Working Paper, 142,* 1-14.

[5] Baswedan, Anies R. (2004). "Political Islam in Indonesia: Present and Future Trajectory". *Asian Survey, 44,* 669-690

Implementasi Prinsip Demokrasi Dalam Pemilihan Umum di Indonesia

Oce Madril

Graduate School of International Development, Nagoya University, Nagoya, Japan

Alamat email: ocemadril@yahoo.com

Abstrak. *Pemilu merupakan bagian terpenting dari demokrasi. Pemilu menjadi persyaratan utama untuk menyatakan sebuah negara demokratis atau tidak. Negara yang mendeklarasikan dirinya sebagai negara yang demokratis, maka negara tersebut harus melaksanakan pemilu. Namun, negara yang telah melaksanakan pemilu tidak dapat serta merta dikatakan sebagai negara yang demokratis. Karena pemilu yang dilaksanakan haruslah pemilu yang sesuai dengan prinsip-prinsip demokrasi. Hanya pemilu yang dilaksanakan secara demokratis yang dapat mengukur kualitas demokrasi sebuah negara. Oleh karena itu, pemilu yang demokratis merupakan suatu hal yang terpenting dalam negara yang demokratis.*

Dalam sejarah ketatanegaraan Indonesia, pemilu telah dilaksanakan sebanyak 10 (sepuluh) kali, yaitu pada tahun 1955, 1971, 1977, 1982, 1987, 1992, 1997, 1999, 2004 dan 2009. Apakah pemilu Indonesia sudah memenuhi persyaratan pemilu yang demokratis? Untuk menyatakan pemilu Indonesia sudah demokratis atau tidak, maka dapat dilihat berdasarkan asas, penyelenggara dan sistem pemilu. Oleh karena itu, penelitian ini fokus pada implementasi prinsip-prinsip demokrasi dalam pemilu di Indonesia berdasarkan asas, penyelenggara dan sistem pemilu. Pertanyaan utama yang harus dijawab dalam penelitian ini adalah apakah pemilu di Indonesia, terutama pasca reformasi, sudah sesuai dengan prinsip-prinsip pemilu yang demokratis? Untuk menjawab pertanyaan tersebut, penelitian ini mengevaluasi pelaksanaan pemilu sebelum dan setelah reformasi. Analisis mencakup tiga isu utama, yakni asas, penyelenggara dan sistem pemilu. Setelah menganalisis semua data (primer dan sekunder), maka disimpulkan bahwa pelaksanaan pemilu Indonesia ditinjau dari asas, penyelenggara dan sistem pemilu, dapat dikatakan telah memenuhi prinsip – prinsip pemilu yang demokratis, akan tetapi, belum mencapai titik sempurna. Sebab, masih adanya distorsi terkait penyelenggara (KPU) dan sistem pemilu, baik ditingkatan pengaturan hukum maupun pelaksanaannya dilapangan. Diperlukan upaya perbaikan agar pemilu di Indonesia benar – benar bisa menyandang predikat sebagai pemilu yang demokratis.

Kata Kunci: Pemilihan Umum, Demokrasi, Indonesia

Kategori: *Social and Economic Science*

Media Presentasi: Presentasi Oral

Daftar Pustaka:
[1] Dahl, Robert A., (2001) *Perihal Demokrasi Menjelajahi Teori dan Praktek Demokrasi Secara Singkat*, Yayasan Obor Indonesia, Jakarta.
[2] Karim, M. Rusli, (1991) *Pemilu Demokratis Kompetitif*, Tiara Wacana, Yogyakarta.
[3] Kristiadi, J, (1997) *Menyelenggarakan Pemilu Yang Bersifat Luber dan Jurdil*, CSIS, Jakarta.
[4] Kartawidjaja, Pipit R. dan Mulyana W. Kusumah, (2002) *Sistem Pemilu dan Pemilihan Presiden: Suatu Studi Banding*, Inside, Jakarta.
[5] Mahfud MD, Mohammad, (2000) *Demokrasi dan Konstitusi di Indonesia*, Rineka Cipta, Jakarta.

Factors Determine Indonesian Palm Oil Export

Ambiyah Abdullah

Graduate Schoolof International Development, Nagoya University

ambiyah2001@yahoo.com

Abstract. Indonesia is the largest producer of palm oil and second largest exporter in the World. Palm is also important sector for Indonesian economy through providing job opportunities for poor people, main source of cooking oil, and source for government revenue. Recently, world demand for palm oil increases due to increasing demand of bio- fuel. This causes both positive and negative effect. To face this challenging, Indonesian government has planned to expand palm oil plantation in Indonesia to increase production and export to world market. Related to this phenomenon, this paper try to examined two important things are (1) behavior of Indonesian palm oil export and (2) determine factors influence Indonesian palm oil export using descriptive analysis and econometric analysis. For examine the factors determine Indonesian palm oil export, we have applied a model where export is a function of cost of export, GDP of foreign countries, GDP of Indonesia, domestic production, world price, exchange rate, domestic consumption, and interest rate. Our results showed that domestic production and interest rate are important factors determine palm oil export from Indonesia.

Keywords: Indonesia, Palm Oil, Export Determinants

Category: *Social and Economic Sciences*

Presentation Media: Oral Presentation

Selected References

Journals
[1] Athukorala, P.& Riedel J. 1994,' Demand and Supply Factors in Determination of NIE Exports: A Simultaneous Error Correction Model for Hongkong: A Comment', *The Economic Journal,* Vol 102, No 415, pp. 1467-1477.
[2] Balasa, B., Voloudakis, Fylaktos & Suh 1989,' the Determinants of Export Supply and Export Demand in Two Developing Countries: Greece and Korea', *International Economics Journal,* Vol 3, Number 1, 1989.
[3] Goldstein, M.& Khan M.S. 1978, " The Supply and Demand for Exports: A Simultaneous Approach', The Review of Economics and Statistics, Vol 60, No 2 (April, 1978), pp. 275-286.

Analyzing Domestic Demand-led Growth Strategy through Demand Shock on Indonesian Economy

[1]**Angga Pradesha**

[1] **Master Student, International University of Japan, 777 Kokusai-cho, Minami Uonuma-shiNiigata 949-7277 Japan**

Email address: anggapradesha@gmail.com

Abstract. *Global economic crisis has caused the sluggish of U.S and European countries demand of Asian exports. Considering global imbalances issue, this condition urged most Asian countries to shift its growth strategy from export led-growth to domestic demand-led growth. The latter one is believed to be more sustainable as it is rooted in domestic market growth, which then reduces the vulnerability to external shock in the process of development (Palley, 2002). Blecker (2002 and 2003) also argues that export-led growth strategy suffers from a fallacy of composition, whereby it assumes that all countries growth is relied on demand growth of other countries, limited by the capacity of advanced countries.*

Encouragement process to domestic demand-led growth strategy in Asia should give more advantage to Indonesian economy, considering its significant number of population, reflecting huge potential of domestic demand from consumption side. This paper analyzes the impact of demand shock on five aggregated sectors (agriculture, mining, industry, non-traded service, service) in Indonesia to observe which sector that has strongest linkages to the economy reflected by its multiplier effect. We utilize Social Accounting Matrices (SAM) 2005 data to calculate multiplier effect by introducing identical shock to each sector in doing simulation.

Based on the findings, it is observed that non-traded service sector generates the highest output multiplier followed by Agriculture and Service sector, which equal to 3.81, 3.74 and 3.71 respectively. However, agricultural sector generates the highest income multiplier, which accounts for 1.34. Further analysis is then focused in comparing non-traded service sector and agricultural sector based on the decomposition of each multiplier effects. As the objective is to seek the strategic sector in promoting demand-led growth strategy, industrial sector that is highly dependent on import, weakening the rounding effect through its leakages need to be concerned. Between the two sectors, non-traded sector has stronger linkage to industrial sector, which reflects smaller amount of output produce domestically in providing higher demand from this non-traded service sector shock. In addition, demand shock on agricultural sector results higher direct effect compare to direct effect on non-traded service sector which are 1.36 and 1.33 respectively. As discussed earlier, agricultural sector generates the highest income multiplier, however it gives neither the highest impact to rural household with or without land, instead, it generates the highest multiplier to the urban household.

The simulation results reveal the importance of agricultural sector as a means of expanding national GDP and raising household incomes. However, high transportation cost indicated by strong linkages of agricultural demand shock on service sector needs more attention in reducing inefficiency. Better capital access to rural household might help to improve income distribution as most capital transfer from firm is dominated by urban household.

Keywords: Domestic demand led-growth, Multipliers effect, Indonesian economy

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References:

Books

[1] Blecker, R. (2002). "The Balance of Payments-constrained Growth Model and the Limits to Export-Led Growth." In P. Davidson, ed., *A Post Keynesian Perspective on Twenty-First Century Economic Problems*. Northampton, MA: Edward Elgar.

[2] ------------- . (2003). "The Diminishing Returns to Export-Led Growth." In W. Russell Mead and S. R. Schwenninger, eds., *The Bridge to a Global Middle Class: Development, Trade, and International Finance in the 21st Century.*

[3] Breisinger, C., M. Thomas and J. Thurlow. (2009). "Social accounting matrices and multiplier analysis: An introduction with exercises". Food Security in Practice technical guide 5.Washington, D.C.: International Food Policy Research Institute.

Journals

[4] Palley, T.I. (2002) "A New Development Paradigm: Domestic Demand-Led Growth. Why It is Needed & How To Make it Happen. Foreign Policy in Focus Discussion Paper.

Electronic Government Adoption in Indonesia : Case Study of Bandung City

Farah Alfanur

Department of Industrial Administration, Faculty of Science and Technology, Tokyo University of Science, 2641 Yamazaki, Noda-shi, Chiba-ken 278-8519

Email Address: farah.029@gmail.com

Abstract. *Various countries, including Indonesia, are implementing electronic government, generally known as "e-Government', hoping to obtain great benefits. Benefit is that e-Government would help to achieve specific outcomes. The internet can help stakeholders share information and ideas and contribute to specific policy outcomes. E-Government also contributes to other economic policy objectives by reducing government expenditures through more effective and efficient programs, improving business productivity through administrative simplification and promoting the information society and ICT industry. E-Government acts as a factor for reform in e-Government. Finally, building trust between governments and citizens is fundamental to good governance. ICT can help building trust by enabling citizen engagement in policy process, promoting open and accountable government and helping prevent corruption. However, many e-Government projects have failed to deliver their promises. Some of such failures are thought to be the results of lack of understanding about the relationships among 'technologies', 'information use', 'organizational factors', 'social contexts involved in the selection, implementation and use of information and communication technologies (ICT)'. These factors stated above might have produced mismatches and unintended consequences. These led to the low adoption level from citizen to e-Government system.*

Adopting good strategies are crucial in order to overcome the barriers. The objective of this study is to identify the key factors to the acceptance and diffusion of e-Government in the case of the e-Government program in Bandung municipality, Indonesia, which is assumed as a typical example of municipalities in developing nations. A causal model based on system dynamics modeling are developed indicating how the various drivers of adoption interact with one another. In particular, the model, takes not only the supply side perspective which describes the mechanism of creating and operating the e-Government system but also the demand side perspective which explains the people's intentions of communicating with the e-Government and their behaviors toward it. The model is aimed to use as a decision support system and applicable to the planning process of the e-Government implementation in Bandung municipality. This research is useful in the public management field.

The result from supply side analysis, similarly to the website of a private company, the attractiveness and usefulness of that of a municipality to the people living both within and outside the municipality are dependent on the richness of information and services provided at its website and the easiness to access the targeted information and services. The stage of each function primarily depends on national and local legal restrictions, the ICT skills of local government officials and the stock of information. In addition, the latter two factors primarily depend on the allocated budget to improve its web-enabled stage. Leader's firm intention to utilize the Internet is the key driver of promoting the use of the Internet. Subsequently, the willingness of the leader increases the related budget and motivates staff members in the municipality to improve their ICT skills and to create and edit the information necessary to be open to the public. The easiness to access the targeted information and services are depends on the ICT skill of the staff working at the ICT department in the municipality and on the allocated budget to the department.

From demand side perspective, in order to ensure the success of e-Government implementation, the government should actively marketing its e-Government services, improve citizen's awareness of the benefits and increase take up of online services. The marketing strategies include advertisements on television and radio, advertisement in airline magazines and newspaper, and also word of mouth factor. Surveys about their attitudes and needs to provide the contents which is usefulness and easy to use for all level of citizens. The idea is to reach out the customers and proactively see what they want. Provide internet access points in

convenient places such as public libraries, shopping malls, government offices, hospitals, and relevant public places for the citizens to use free of charge.

Keywords: e-Government , demand side perspective, supply side perspective, system dynamics

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References

Books

[1] Sterman JD. (2000) *Business dynamics : Systems Thinking and Modelling for a Complex World,* Irwin/McGraw-Hill: Boston

Journals

[2] Mahadeo, J, D., "Towards an Understanding of the Factors Influencing the Acceptance and Diffusion of e-Government Services." Electronic Journal of e-Government Volume 7 Issue 4 2009, (pp391-402), available online at www.ejeg.com

[3] Mohsin, and Raha.(2006). "Implementation of Electronic Government in Malaysia: The Status and Potential for Better Service for the Public" Public sector ICT Management Review

[4] Takeshi Arai. (1999). "Questionnaire to the small municipalities in Japan about the constraints on and the effects of utilizing the Internet" in Proceedings of the Autumn Conference of Japan Society of Management Information, *, p*355-358 (in Japanese)

[5] Wangpipatwong, S. Chutimaskul, W. and Papasratorn, B, "Understanding Citizen's Continuance Intention to Use e-Government Website: a Composite View of Technology Acceptance Model and Computer Self-Efficacy" The Electronic Journal of e-Government, Volume 6 Issue 1, 2008, pp 55 - 64, available online at www.ejeg.com

Comparative Study between Public Servants' Ethics based on Regulation and Ethics Learned in Pre-service Training: Case Study of Ministry of Manpower and Transmigration Republic of Indonesia

Ryka Claudia Lolita

Graduate School of International Development, Nagoya University

Ministry of Manpower and Transmigration RI

Email address: ryka.lolita@h.mbox.nagoya-u.ac.jp

Abstract. T*o ensure performing of government general function and development function, the needs of public servants who are efficient, effective, physically and mentally strong, more trustworthy, integrated, having expertise of high skill and experience and fully dedicated solely for the sake of the country and the government's apparatus, are inevitable. As Indonesia's government is also working hard to establish good governance, requirement on effective and efficient workers who are free from corruption, collusion, and nepotism is definitely needed.*

Education and training programs for public servants are designed to improve personality, knowledge, and capability of the employee and conducted under the authority of National Administration Institute (LAN). One of the programs, the Pre-service Training, is a compulsory training given to candidates entering the government work with the purpose of providing them with the necessary skills and knowledge in order to enable them to perform their new jobs. Two groups of candidates who join the pre-service training are university graduate group that will enter government as Grade III and diploma graduate group that will enter as Grade II.

Ministry of Manpower and Transmigration (MoMT) is a government authorized board dealing with quality improvement of Indonesia's manpower and transmigration society. As a government apparatuses, civil servants in MoMT are also requested to carry on the jobs by keeping the manner based on code of ethics that are already comprehensively defined by regulations. Concept of ethics also penetrate to the contents of pre-service training, as it is visible to be observed on curricula and textbooks used. The problem is whether or not the concept of ethics learned through pre-service training conforms to government regulation.

To observe the existence of bias within these two concepts of ethics, this study will analyze definition and scope of ethics stated on both government regulations and textbooks used in pre-service training. There are 12 textbooks of Grade III candidates and 12 textbooks of Grade II candidates that will be textually analyzed.

As a comparison, Laws 8/1974 about Officialdom Principal as amended by Law 43/1999, Laws 28/1999 about State Administration that Free from Corruption, Collusion, and Nepotism, Government Regulation 30/1980 about Discipline Regulation on Public Officers, Government Regulation 42/2004 about Managing Corps Spirit and Ethics Code of Public Officer, and Manpower and Transmigration Ministerial Regulation 05/2007 about Organization and Working Procedures of MoMT will also be analyzed to get the root of concept of public administration ethics.

The research is still going on and the future results are expected to find out the bias between two ethics' concept. Suggestions to government will be made based on the findings to promote better delivery on ethics' understanding through pre-service training. As a long term goal, better awareness on ethics in MoMT is expected to build qualified apparatus in order to serve better for the productive, competitive and prosperous manpower and transmigration society, within the framework of good governance.

Keywords: pre-service training, public servant's ethics, public personnel administration, textbook analysis

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References

Books

[1] Mintorogo, A. (1986). "Chapter 4: Education and training System for Indonesian for Indonesian Public Servants and The Function of The National Institute of Administration in The Field of Education and Training." *Comparative Study on The Training System in The Public Service*, Daiichi-hoki, Tokyo, 65-77.

Journals

[2] Bowman, J.S., Berman, E.M., and West, J.P. (2001). "The Profession of Public Administration: An Ethics Edge in Introductory Textbooks?" *Public Administration Review*, 61(2), 194-205.

The Fukuoka Method as the Preferred Landfill Method Types in Indonesia

Irwan Ridwan Rahim

Civil Engineering Department, Hasanuddin University - Makassar

Email address: Irwanrr@yahoo.com

Abstract. *Type of municipal waste disposal in Indonesia generated poor condition if compared with other countries in Asia based on 2004 data from about 62 final disposal facility (TPA) commonly is open dumping type, only 10 control landfill type although not optimal operation and only one sanitary landfill type in Bantar Gebang. Enactment of Waste Law No 18/2008, forced Local government to propose plan and implementation for open dumping closing at the latest 1 year and 5 year from the waste law enactment (May 2008), thus will create a city or local governments must immediately prepare a Landfill type for their municipal final disposal. Landfill site have been classified into five types, based on the microbial environments existing in the landfill layers, one type of landfills is semi-aerobic landfills or well-known as Fukuoka method landfill. A generic concept for "semi-aerobic landfill development" proposed by Prof.Masataka Hanashima from Fukuoka University which was the first tested in the construction of Shin-Kamata Landfill by Fukuoka City in 1975. This paper will analyze the advantages Fukuoka method other than the four types of landfills for the consideration of the method application on landfill type in Indonesia.*

Keywords: waste, landfill, fukuoka method

Category: *Social and Economic Sciences*

Presentation Media: Oral Presentation

Reference :

Books

[1] Fukuoka City Environmental Bureau Japan (2008) *Towards a Wholly-Recycling Society,"The Fukuoka Method",What is the semi-aerobic landfill?*, Fukuoka University, Fukuoka.

Journals

[2] Lu Aye & E.R Widjaya (2005), Environmental and Economic analyses of waste disposal options fot traditional markets in Indonesia. *Waste Management* 26 (2006) 1180–1191

Internet Sources

[3] Kementrian Lingkungan Hidup, The Role of Landfill, http://www.menlh.go.id/apec_vc/osaka/eastjava/wst_mng_en/page1.html> (Accessed at July 28, 2010)

[4] State Of Environment Report (SoER) of Indonesia 2008, http://air.telapak.org/index.php> (Accessed at July. 28, 2010).

Estimating the Mechanism of Credit Crunch and Its Implication to Monetary Policy in Indonesia

Bambang Pramono

Nagoya University

MA Thesis in International University of Japan

Email address: bpramono2002@yahoo.com

Abstract. *Using disequilibrium model framework, this paper investigates the existence of credit crunch in Indonesia, particularly in the aftermath of crisis. It defines credit crunch as a credit rationing situation due to supply constraint caused by a sharp decline in bank loan supply. This study uses Stiglitz and Greenwald model of loan market to explain the characteristics and mechanism of credit crunch through bankruptcy risk concept. The existence of credit crunch has constrained the effectiveness of monetary policy to encourage the growth of economy. Due to credit crunch, bank loan has an important role in explaining the transmission of monetary policy as proved by impulse response analysis of VECM model. Therefore, the formulation of monetary policy should consider not only interest rate but also the availability of bank loan.*

Keywords: credit crunch, monetary policy

Category: *Social and Economic Sciences*

Presentation Media: Oral Presentation

Selected References:

Books

[1] Agung, J., Kusmiarso,B., Pramono,B., Hutapea, EG., Prasmuko, A., Prastowo, N.J. (2001). Credit crunch in Indonesia in the aftermath of the crisis: facts, causes and policy implications. *Directorate of Economic Research and Monetary Policy, Bank Indonesia.*

[2] Stiglitz, J.E., & Greenwald, B. (2003). Towards a new paradigm in monetary economics". *Cambridge University Press.*

Journals

[3] Bernanke, B., and Lown, C. (1991). The credit crunch. *Brooking Paper in Economic Activity.* February.

[4] Ghosh, A., and Ghosh, S. (1998). East Asia in the aftermath: was there a crunch? *IMF Working Paper,* 1999/38.

[5] Maddala, G.S., and Nelson, FD. (1974), Maximum likelihood methods for model of markets in disequilibrium. *Econometrica,* Vol. 42, No.6, November, pp. 1013-30.

An Overview of Tax Reforms in Indonesia: the Importance of Administrative Aspects

M. Faisal Artjan

Graduate School of International Development

Nagoya University

Email address: artjan.mukhammad.faisal@g.mbox.nagoya-u.ac.jp

Abstract. *Tax reform has long been discussed from the point of views of wide range areas of studies, notably economics and public administration. The term tax reform is mostly related to tax policy formulation. Many economic scholars intensively develop the tax policy formulation discussions in order to achieve efficient and fairness (equity) in tax policy. Efficiency may refer to studies of the administrative/tax collection cost (for the tax authority) and compliance cost (for the taxpayers). Then, fairness (equity) may related to studies of the redistribution of wealth function in various type of tax systems, which produce policy debate such as ideally composition of direct and indirect taxes structure in one country.*

However, studies on tax reform in form of ideal tax policies (and structure) faced difficulties at implementation stage, particularly in developing countries experiences, due to less attention being given to administrative and other constraints. This study tries to explore the Indonesian tax reform experiences, with emphasize on recent issues. Literature reviews and previous studies will be employed to explain and support the arguments.

Indonesia has implemented four major tax reforms since 1980s. The main reasons are to increase non oil and gas revenue and to ensure fiscal stability of the country. The latest tax reform effort began in 2001, Indonesian government with donors assistance implement broad range of administrative reforms, so called "modernization", by focusing on restructuring tax agency (Directorate General of Taxes) organization, introducing new rewards and control mechanism to ensure official's integrity, improving quality of service to the taxpayers while also implementing more transparent and accountable procedures and systems . Developing information technology system and enhancing capacity of officials through training are also other dimensions of tax administration reform. The result of increasing of tax revenues in recent years, as well as improvement tax officials' integrity has shown that administrative matters are crucial in tax reform process.

Tax policy and tax administration reform is inseparable, therefore various studies and discussion regarding empirical studies of tax reform has moved to the public administration areas. Furthermore, In case of Indonesia, tax reform has become the pioneer to reforming overall bureaucracy in the country.

Keywords: Tax Reform, Indonesia, Administrative Aspects

Category: *Social and economic science*

Presentation Media: Oral presentation

Selected References:

[1] Atkinson, Anthony B. and Joseph E. Stiglitz. (1976) "*The Design of Tax Structure*: *Direct versus Indirect Taxation*". Journal of Public Economics

[2] Gillis, Malcolm (1989) editor: *Tax Reform in Developing Countries*. Duke University Press. Durham, NC.

[3] Rizal, Yond (2006), Indonesian Tax Administration Reform: A Paradigm Shift to Good Governance Practice, Forum of International Development Studies 31 (February 2006) pp. 187-210, Nagoya University, Japan

[4] Silvani, Carlos and Katherine Baer (1997), *Designing a Tax Administration Reform Strategy: Experiences and Guidelines*, International Monetary Fund Working Paper, March 1997

[5] Tanzi, Vito (1990) *The IMF and Tax Reform*, International Monetary Fund Working Paper, April 1990

[6] Ministry of Finance, DG of Taxes (2006) *Modernisasi Administrasi Perpajakan: Evaluasi 2005 dan Rencana Kerja 2006-2009*. Tax Administration Modernization Team.

[7] Ministry of Finance, DG of Taxes (2006) *Naskah Akademis Restrukturisasi dan Modernisasi Kantor Pusat DJP*. Tax Administration Modernization Team.

Kebijakan Pajak Pertambahan Nilai dengan Fokus Kemiskinan dan Kesenjangan di Indonesia

Irene Santi Br. Bukit

Graduate School of International Development, Nagoya University, Japan

Email Address: irene_santi@yahoo.com

Abstract. *Pajak Pertambahan Nilai (PPN) di Indonesia pertama kali diadopsi pada tahun 1984. PPN sebagai pajak komoditi, memiliki sifat yang non-kumulatif dan dikenakan di beberapa tingkatan produser dan distributor. Oleh karena itu, PPN dipandang sebagai sistem pajak tidak langsung yang dapat mengatasi kelemahan Pajak Penjualan yang sebelumnya diapakai sejak tahun 1951. Di samping kelebihan tersebut, PPN juga memiliki kelemahan yaitu sifat regresif dimana persentase pajak dikenakan sama terhadap masyarakat tanpa membedakan tingkat penghasilan dan daya beli individu. Indonesia menerapkan kebijakan/fasilitas pengecualian, kebijakan ditanggung pemerintah dan dibebaskan dari PPN untuk mengurangi sifat regresif tersebut. Maka dari itu, studi ini mencoba menemukan komoditas-komoditas yang seharusnya diberikan fasilitas dengan pertimbangan kemiskinan dalam penerapan PPN ini, apakah dengan fasilitas ini, kemiskinan dan kesenjangan di Indonesia dapat diperbaiki. Studi ini menggunakan SUSENAS (Survei Sosial Ekonomi Nasional) 2005 dan menemukan pola konsumsi per rumah tangga pada tahun tersebut. Analisis dilakukan dalam bentuk Lorenz Curve untuk mempermudah pemahaman pembaca. Hasil dari studi ini kemudian dibandingkan dengan kebijakan PPN pemerintah tahun 2005. Kemudian, penelitian ini merekomendasikan komoditas-komoditas yang diberikan fasilitas dalam PPN, menambah dan mengurangi daftar komoditas yang ada untuk menyempurnakan kebijakan pemerintah di masa mendatang.*

Keywords: Pajak, Pajak Pertambahan Nilai, Komoditas, SUSENAS, Fasilitas Pajak

Kategori Bidang Keilmuan: *Social and Economic Sciences*

Media Presentasi: Oral Presentation

Daftar Pustaka
Buku
[1] Sukardji, Untung (2009) *Pajak Pertambahan Nilai*, Jakarta: PT Raja Grafindo Persada
[2] Deaton, A. (1997) *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, The World Bank, p. 271-334
Jurnal
[3] Arndt, C. and Tarp, F. (2009) *Taxation in a Low-Income Economy: The case of Mozambique*, USA, Canada: Routledge Studies in Development Economics
[4] Auriol, Emmanuelle and Michael Warlters, *(2005) "Taxation Base in Developing Countries",* Journal of Public Economics, Vol.89, pp. 625 – 646

Six Sigma as Innovation Management Tool
for Gaining Competitive Advantage

Yudi Azis

Graduate school of Innovation Management

Tokyo Institute of Technology

Email Address: yudiazis@yahoo.com

Abstract. *Nowadays, many companies are facing problems due to advancing technology, evolving customer desires, short product life cycle, and so forth. Innovation is believed as one of the most competitive advantages for enhancing and sustaining business performance (Verganti; 2009). However, due to its complexity, it is not easy to deal with innovation. Some reasons which make innovation management is difficult and hard to implement such as: (1) lack of people support, (2) overloaded with daily activities, (3) failure to manage interest due to long term innovation process, (4) Innovation has long payback period, and (5) Innovation is expensive (Azis and Osada, 2009). Thus, the innovation needs systematic approach to be effectively implemented.*

Meanwhile, Six Sigma is proven to be a systematic approach in enhancing business performance. The success stories of Six Sigma in improving business performance have been reported in many articles (Antony, et.al. 2006). Nevertheless, only a few academic articles on Six Sigma have been published in academic journal (Watson and De Yong, 2010). The review of the literatures on Six Sigma features gives various difference perspectives because Six Sigma has been evolving since its first publication by Motorola in middle 1980s. In this regards, the author adopt the definition suggested by Schroeder et al. (2008), which has established academic definition. They have defined Six Sigma as: "an organized, parallel-meso structure to reduce variation in organization processes by using improvement specialist, a structured method, and performance metrics with the aims of achieving strategic objectives".

In this article, the authors attempt to discuss Six Sigma features on innovation management for improving competitive advantage. Through an empirical studies of leading companies, both in manufacture and services sectors, the authors confirms that Six Sigma has unique features to strengthening the innovation management process. These features are: (1) DMAIC (Define-Measure-Analyze-Improve-Control) problem solving methodology for incremental innovation; (2) IDDOV (Identify, Define, Develop, Optimize, Verify) value creation methodology for radical innovation; (3) Belts infrastructure with cross functional project team (Master Black Belts, Black Belts, Green Belts, and Champions); (4) strong linkage with financial and human resource department for maintaining motivation to innovate; (5) Concurrent and simultaneous between training and initial project practice for learning curve and knowledge management; (6) Strong linking of Six Sigma with business strategy and strategic project selection for directing the innovation process; and (7) Assign an expert as a leader team (Black Belts) on full time based job for enhancing level of successes. The author believed that these unique have help companies manage their innovation journey for performance excellence and sustainable growth.

Keywords: Six Sigma, Innovation management, world class companies, critical success factors.

Category: *Social and Economic Sciences*

Presentation Media: Oral Presentation

Selected References

Books

[1] Antony, J., Banuelas, R. and Kumar, A. (2006) World Class Applications of Six Sigma: Real World Examples of Success, Butterworth-Heinemann: Oxford.

[2] Verganti, R. (2009) Design Driven Innovation: changing the rules of competition by radically innovating what things mean. US, New York: Harvard Business Press.

Journals

[3] Schroeder, R.G., Kevin Linderman, Charles Liedtke, Adrian S. Choo (2008). "Six Sigma: definition and underlying theory". *Journal of Operations Management*. Vol 26, pp 536-554.

[4] Watson, G.H., and DeYong, C.F. (2010) "Design for Six Sigma: caveat emptor", *International Journal of Lean Six Sigma"*, Vol. 1, No.1, pp.66-84.

Conference Proceeding

[5] Azis, Yudi & Osada, H. (2009). Six Sigma impact on innovation management system and its comparison with TQM, *Proceeding ANQ Congress 2009*, Tokyo, Japan. pp 998-1007

Value Co -Creation Model of Service Innovation in Service System

Santi Novani

Value and Decision Science, Tokyo Institute of Technology, 2-12-1 Ookayama, Tokyo

santi@valdes.titech.ac.jp

Abstract. *Service system is the dynamic interaction between customer and provider. Service means different things in the provider sphere as compared to the customer sphere. Customer and provider have diverging and sometimes even conflicting goals. Hypergame model, in general, explicitly assumes that the players involved possess subjective internal model (different perspective) of the environment including the counterparts. We assume customer has expectation for the service and provider has capability to provide the content of service. Therefore, understanding what customers expect and how provider can fulfill the variable needs for customer satisfaction are becoming important issues in service science. From service science perspective, value co-creation based on mutual understanding between customer and provider is one of fundamental importance. Service-dominant (S-D) logic is a perspective for understanding value creation and marketing. The roles of providers and consumers are not distinct, meaning that value is co-created, jointly and reciprocally, also mutually beneficial relationship. This paper tries to analyze mutual understanding process between customer expectation and provider capability in terms of symbiotic hypergame model. First, we define several types of customers and providers in airline service problem by characterizing them using their internal model and interpretation function in terms of symbiotic hypergame. Interpretation function is a function specifying how customer (resp. provider) interprets internal model of provider (resp. customer). Then, we will analyze formally how mutual understanding between customer and provider leads to satisfaction of both customer and provider for each pair of customer and provider types. The analysis allows us to derive deep insights about relationship between sufficient mutual understanding and satisfaction that can be obtained only through such rigorous model analysis. The results of our analysis show that mutual understanding is the existence of Hyper Nash equilibrium. Expectation from the customer and innovativeness from the provider are crucial in mutual understanding. Mutual understanding has been achieved by customer with high expectation and innovative provider.*

Keywords: *Co-experience, Co- definition, Value Co-creation, Symbiotic Hypergame*

Category: *Humanities, Language and Cultures*

Presentation Media: Oral Presentation

References
[1] Kijima, K., Intelligent Poly-Agent Learning Model and its Application, Information and Systems Engineering, 2 (1996) 47-61.
[2] Kijima K (2009), Service System Science, Presentation, Graduate School of Decision Science and Technology, Tokyo Institute of Technology.
[3] Spohrer, J., Anderson, L., Pass N., Ager, T., Gruhl, D. (2007), Service Science, IBM Research, Journal of Grid Computing, Special Issue on Grid Economics and Business Models.
[4] Vargo, S. L. and Lusch, R. F. (2008a), Service-dominant logic: Continuing the evolution. Journal of the Academy of Marketing Science 36(1), 1–10.
[5] Gronroos, Christian (2009), Toward Service Logic: The Unique Contribution of Value Co-Creation, Working Papers, ISBN 978-952-232-070-4, ISSN 0357-4598.

The IASB/FASB Joint Project on Conceptual Framework:

Kemungkinan Mengadopsi Perspektif Entitas

Aprilia Beta Suandi[1,2]

[1]Fakultas Ekonomi dan Bisnis, Universitas Gadjah Mada, Yogyakarta, Indonesia

[2]Graduate School of Economics, Nagoya University

Email Address: apriliasuandi@ugm.ac.id, liasuandi@yahoo.com

Abstrak. *Pada bulan Juli 2006, U.S. Financial Accounting Standard Board (FASB) dan International Accounting Standards Board (IASB) menerbitkan publikasi bersama* the Discussion Paper, Preliminary Views on an improved Conceptual Framework for Financial Reporting: The Objective of Financial Reporting and Qualitative Characteristics of Decision –Useful Financial Reporting Information. *Dokumen ini merupakan publikasi pertama yang dilakukan bersama oleh FASB dan IASB. Pada manuskrip ini, keduanya mengajukan usulan untuk mengadopsi perspektif entitas* (entity perspective) *sebagai dasar pelaporan keuangan. Padahal, meskipun tidak disebutkan secara langsung, perspektif pemilik* (proprietary perspective) *lebih dominan di dalam praktik-praktik akuntansi selama ini. Meskipun sebagian besar tanggapan tertulis atau* comment letter *yang menanggapi* discussion paper *menyatakan ketidaksetujuannya terhadap ide tersebut, FASB dan IASB masih mengajukan kembali ide yang sama di dalam* Exposure Draft *yang dipublikasikan pada 29 Mei 2008.*

Makalah ini bertujuan untuk mengetahui kemungkinan mengadopsi perspektif entitas dengan menganalisis 142 tanggapan tertulis yang diterima oleh FASB dan IASB setelah penerbitan exposure draft. Berbeda dari komentar yang diterima setelah penerbitan discussion paper*, sebagian besar tanggapan tertulis, yaitu sebanyak 63 tanggapan, menyatakan setuju dengan usulan untuk mengadopsi perspektif entitas, 22 tanggapan meyatakan ketidaksetujuannya, sedangkan 57 tanggapan tertulis lainnya tidak menanggapi isu ini. Tanggapan-tanggapan yang diterima oleh kedua dewan ini juga menunjukkan keragaman pemahaman mengenai perspektif entitas ataupun teori entitas oleh berbagai pihak. Lebih jauh lagi, mengadopsi teori entitas secara penuh akan menyebabkan pergeseran paradigma.*

Draft akhir dari fase pertama conceptual framework *ini pada awalnya direncanakan untuk diterbitkan pada akhir 2009. Namun, FASB dan IASB mengumumkan penundaan penerbitan draft akhir dan menjadwalkan ulang penerbitan pada triwulan ke-3 tahun 2010.*

Kata kunci: Perspektif Entitas, Teori Entitas, Perspektif Pemilik, Teori Kepemilikan, Conceptual Framework

Kategori: *Social and Economic Science*

Media Presentasi: *Presentasi Oral*

Daftar Pustaka

Buku:

[1] Anthony, Robert N. (1984), *Future Directions for Financial Accounting,* Illinois, Dow Jones-Irwin.

[2] Hendriksen, Eldon S. and Michaelf Van Breda (2001), *Accounting Theory,* Fifth Ed. Singapore: McGraw-Hill.

Sumber Internet:

[3] IASB/FASB (2006), *Preliminary Views on an improved Conceptual Framework for Financial Reporting: The Objective of Financial Reporting and Qualitative Characteristics of Decision – Useful Financial Reporting Information.*

[4] IASB/FASB (2008), *Exposure Draft of an Improved Conceptual Framework for Financial Reporting: The Objective of Financial Reporting and Qualitative Characteristics and Constraints of Decision –Useful Financial Reporting Information.*

Lain-lain:

[5] Satoh, M., & Suandi, A. B. (2009). Japanese Responses to the Exposure Draft on the Conceptual Framework of Financial Accounting by IASB/FASB: The International Comparison. *10th Conference of Asian Academic Accounting Association*, (pp. 2048-2076). Istanbul.

The Notion of Rule of Law and Court Delays in Indonesia

TM. Luthfi Yazid

Visiting Professor at Gakushuin University, Tokyo

Email address: tmluthfiyazid@yahoo.com

Abstract. *There are several definitions, descriptions and meanings of the concept of constitutionalism. Professor Yash Ghai, for instance, defines constitutionalism as "the rule of law", (ROL) therefore "no body is above the law", while Friedrich describes as "divided power" to create a system of effective restraints upon governmental operation. With similar terms Andrews and Schochet conceptualise constitutionalism as "limited government". In Indonesian term, constitutionalism was a synonym of the negara hukum, rechstaat or the law-state that became common fare during the establishment of the New Order in 1966 onwards. The question is: have we reached the idea of negara hukum? In fact, the notion of the rule of law is still becoming just an idea and the success story of legal reform still in waiting. Of course there are some changes and reforms in the country in terms of the numbers of regulations that has been promulgated, legal institutions/ state auxiliaries bodies that has been established. A proper court is "a ticket for entry" toward the negara hukum. Therefore, any form of court delays are against human right principles and ROL. The face of court delays are like riding a bus with many passengers in Jakarta. No guarantee about the time of departure and arrival, whether the driver drunk alcohol or not, whether the engine is in a good condition or not. Whether we will arrive safely or the oposite way. In a nutshell there are full of uncertainty. In such decay situation it is commonly said that "it is not important to know the law, but the most important is to know the judges". In short, to reach the rule of law and to set up a democratic nation it needs a sustainable movement. Indeed, it is still long way to go and far to reach the rule of law in Indonesia without dramatical efforts and gigantic legal reform under a strong national leadership.*

Keywords: the notion of rule of law, negara hukum, court delays in Indonesia

Category: *Social and Economic Sciences*

Presentation Media: Oral presentation

Selected References：

Books:

[1] Ghai, Yash, 1993, *'The Theory of The State In The Third World and Problematic of Constitutionalism'* in *Constitutionalism and Democracy, Transition in The Contemporary World*,
[2] Friedrich, Carl J., 1964, *Constitutional Government Democracy*, (Blaisdell Publishing Company, New York, Toronto and London), revised edition g, Douglas (eds.), (Oxford University Press)

[3] Andrews, William G., 1968, *Constitution and Constitutionalism*, (D. Van Nostrand Company LTD, London)

[4] Schochet, Gordon, J., 1979, *'Introduction: Constitutionalism, Liberalism and the Study of Politics'* in *Constitutionalism*, Pennock, Rolland J. and Chapman, John W., (eds.)

Journal

[5] Ghai, Yash, 1986, *'The Rule of Law, Legitimacy and Governance'*, *International Journal of the Sociology of Law*

The Effects of Political Competition on Economic Performances: Do Religion and Regional Differences Matter?

Irwanda Wisnu Wardhana

Hitotsubashi University, Tokyo

Email address: irwandawisnu@gmail.com

Abstract. *This research introduced a new empirical approach for investigating the effects of political competition on economic performance by employing 65 developing countries for a 31-year period (1977-2007) and utilizing a religion subsample (Islam, Christianity, Hinduism, and Buddhism) and a region subsample (Asia, Africa, America, and Europe). By employing these subsamples, this research succeeded in avoiding the potentially misleading generalizations from evidence that are derived from aggregate data and aggregate regressions; and able to discover specific patterns in particular regions and religions.*

As an illustration, by using an aggregate regression and aggregate data, this research discovered that there is no significant relationship between political competition and the corruption perception index in developing countries. However, by employing a subsample regression, significant evidence confirms that a positive association between these two variables exists in Asian developing countries. Therefore, the research suggested that democratization process may influence economic performances in different directions and by different magnitudes based on the country's characteristics and its uniqueness in the region and the religion embraced.

Keywords: political competition, political economy, religion and regional differences

Category: *Social and Economic Science*

Presentation Media: Oral Presentation

Selected References

Books

[1] Helpman, Elhanan. (2004). *The Mystery of Economic Growth*. Belknap Press of Harvard University Press (September 30, 2004). 978-0674015722.
[2] Persson, Torsten., and Tabellini, Guido. (2003). *The Economic Effects of Constitutions*. The Massachusetts Institute of Technology Press, 2003.

Journals

[3] Beck, Nathaniel, and Katz, Jonathan N. (1995). What to do (and not to do) with Time-Series Cross-Section Data. *The American Political Science Review*, Vol. 89, No. 3 (Sep., 1995), pp. 634-647. American Political Science Association. [http://www.jstor.org/stable/2082979].
[4] Pinto, Pablo M. and Timmons, Jeffrey F. (2005) *Comparative Political Studies, Vol. 38, pp.26-50, 2005*.
[5] Mulligan, Casey B., Gil, Ricard. and Sala-i-Martin, Xavier (2004). Do Democracies Have Different Public Policies than Nondemocracies? *The Journal of Economic Perspectives*, Vol. 18, No. 1. (2004), pp. 51-74. American Economic Association. [http://www.jstor.org/stable/3216875].

HUMANITIES, LANGUAGE AND CULTURE

Pendidikan Pada Masa Demokrasi Terpimpin (1959-1965)

Murni Ramli

Graduate School of Education and Human Development, Nagoya University, Japan

moernier@gmail.com

Abstract. *Pada periode 1945-1949 kebijakan pendidikan tidak dapat disusun dengan baik karena pemerintah harus menghadapi tentara Belanda yang ingin menjajah kembali dan munculnya pemberontakan gerilya di daerah sehubungan dengan pengakuan status mereka dalam pembentukan Angkatan Bersenjata RI. Kurikulum untuk SD berhasil disusun tahun 1947, sementara kurikulum SMP dan SMA baru diselesaikan pada tahun 1952. Oleh karena itu pada periode tersebut, kurikulum yang dipergunakan untuk level pendidikan menengah adalah kurikulum sekolah Belanda. Tahun 1950 diberlakukan Undang-Undang No.4 Tahun 1950 Tentang Dasar-Dasar Pendidikan dan Pengajaran di Sekolah. Namun, karena UU ini tidak memuat tentang pendidikan tinggi, maka secara konsep tidak dapat dikatakan sebagai UU Sistem Pendidikan Nasional, sebagaimana UU yang lahir kemudian. Tahun 1959, Indonesia memasuki masa Demokrasi Terpimpin yang dipengaruhi kuat oleh paham komunis. PKI yang menjadi pendukung terkuat Sukarno diduga mempengaruhi kebijakan pemerintah pada masa itu, termasuk dalam sektor pendidikan. Seperti apa konsep pendidikan pada masa itu belum banyak dituliskan dalam kajian sejarah pendidikan di Indonesia. Penelitian ini bertujuan untuk menganalisa model pendidikan pada masa demokrasi terpimpin dengan menggunakan metode analisa perundangan dan kurikulum. Obyek penelitian difokuskan pada pendidikan menengah yang diduga mengalami perubahan besar pada masa itu. Hasil yang diperoleh adalah bahwa persekolahan pada era Demokrasi Terpimpin mengalami perubahan dibandingkan masa sebelumnya, terutama sistem penjurusan di SMA dan pengembangan sekolah kejuruan. Selain pendidikan nasional yang dikembangkan pemerintah, PKI juga mengembangkan sekolah-sekolah kader dari level pendidikan rendah hingga pendidikan tinggi yang diakui keberadaannya sebagai sekolah swasta. Kurikulum sekolah negeri 1962 mengacu pada kurikulum pendidikan yang dikembangkan oleh PKI. Tahun 1965 dikeluarkan Penetapan Presiden No.19 Tahun 1965 Tentang Pokok-Pokok Sistem Pendidikan Nasional Pancasila yang memperkenalkan sistem pendidikan 9.3.4.*

Keywords: Sistem Pendidikan, Demokrasi Terpimpin, Pendidikan Komunis

Category: *Humanities, Language and Cultures*

Presentation Media: Oral Presentation

Selected References

Books

[1] Hindley, D. (1964). *The Communist Party of Indonesia 1951-1963*. University of California Press, Berkeley and Los Angeles,

[2] Suparjono, E.(1966). *Sistem Pendidikan Nasional Pantjasila*. Penerbit Bharata, Jakarta

Journals

[3] McVey, R.T. (1990). Teaching Modernity : The PKI as an Educational institution. *Indonesia*, 50(25th Anniversary Ed.), 5-27.

[4] Tanigawa, Y.(1962). Indonesia kyousantou to minzoku dokuritsu undou: 1920-1927.

Kyushu Daigaku Houseigakkai, Journal of Law and Politics, 28(4), 331-361 (in Japanese)

[5] Thomas,R.M.(1981).Indonesian Education: Communist Strategies (1950-1965) and Governmental Counter Strategies (1966-1980). *Asian Survey*, 21(3), 369-392.

Memanfaatkan *Community Center* Sebagai Pusat Kegiatan Belajar Masyarakat Indonesia di Jepang

Sri Yayu Indriyani Rochandi

Forum Silaturrahim Muslimah (FAHIMA) -Jepang

Asahidai 1-50, Nomi, Ishikawa, 923-1211

Email address: yayu_indriyani@yahoo.com

Abstract *Tulisan ini memaparkan tentang pemanfaatan community center sebagai pusat kegiatan belajar masyarakat yang tinggal di Jepang. Penulis mengambil sampel yaitu Miyatake Community Center karena lokasinya dekat dengan tempat tinggal penulis dan kemiripan dengan kondisi pedesaan di Indonesia. Hasil penelitian yang dilakukan oleh penulis menunjukkan bahwa kegiatan yang diadakan di Miyatake Community Center terbuka bagi seluruh masyarakat dari anak-anak sampai orangtua. Selain itu para warga asing pun dapat terlibat aktif memanfaatkan kegiatan yang ada. Jenis kegiatan beragam mulai dari olahraga, keterampilan wanita, bermain bersama balita, hobi serta mempelajari budaya Jepang. Miyatake Community Center berlokasi di Miyatake, Nomi-Shi, Ishikawa-ken, sebuah daerah di kawasan Hokuriku. Penulis berharap para pelajar dan keluarga pelajar Indonesia yang sedang tinggal di Jepang tidak melewatkan kesempatan untuk menimba ilmu dan pengalaman dari Community Center yang ada di lingkungan masing-masing. Bekal ini dapat menjadi ilmu yang bermanfaat saat kembali ke tanah air. Semoga dapat diaplikasikan pula di pusat-pusat kegiatan belajar masyarakat di Indonesia*

Ada tiga sistem pendidikan di Jepang, yaitu pendidikan rumah, pendidikan sekolah (formal) dan pendidikan sosial (non-formal). Jepang telah mengenalkan sistem pendidikan sosial (shakai kyoiku) atau pendidikan non formal pada masyarakat setelah Perang Dunia ke II, tepatnya sejak tahun 1949. Pendidikan sosial dilakukan melalui berbagai proses kegiatan pembelajaran gratis dan murah melalui pusat kegiatan belajar masyarakat yang dibangun di seluruh wilayah Jepang. Salah satu bentuknya adalah Community Center.

Pembangunan Community Center oleh pemerintah Jepang adalah sebagai wujud kepedulian dalam merekonstruksi pendidikan di Jepang pada saat itu. Pendidikan formal (sekolah) dirasa masih kurang sehingga perlu suatu pendidikan tambahan yang dapat menyatu dan melayani seluruh masyarakat. Contoh pendidikan tambahan tersebut adalah keterampilan, penyaluran hobi dan budaya. Dengan model ini, diharapan dapat meningkatkan kemampuan, keterampilan dan kepercayaan diri masyarakat.

Penelitian dilakukan dengan cara studi berbagai literatur tentang sejarah Miyatake Community Center, jenis kegiatan yang dilakukan dan kunjungan langsung ke lokasi.

Menurut pengamatan penulis, warga asing yang tinggal di Jepang, khususnya para Ibu dan anak-anak yang menemani suami melanjutkan kuliah di kota Nomi masih kurang terlibat aktif di Community Center terdekat. Masalah utamanya adalah kesulitan memahami informasi berbahasa Jepang tentang kegiatan yang berlangsung di Community Center. Pihak City Hall sebenarnya sudah mengirimkan informasi ke masyarakat melalui Shougakkou (Sekolah Dasar) anak-anak maupun pamplet dan majalah bulanan ke kotak pos seluruh masyarakat. Ini patut disayangkan karena banyak sekali kegiatan menarik dan mendidik serta murah yang ditawarkan oleh Community Center untuk seluruh warganya termasuk warga asing.

Sebagai contoh, Miyatake Community Center membuka pendaftaran kelas keterampilan setiap bulan Mei untuk anak-anak dan orang dewasa. Kegiatan dilakukan seminggu sekali dalam rentang sepuluh bulan. Jenis kegiatan di antaranya:

a. *melukis,*
b. *olahraga: badminton, senam aerobik*
c. *mendaki gunung,*
d. *kegiatan ibu dan anak balita,*
e. *menjahit,*
f. *membuat berbagai asesoris,*

    g.   *memasak,*

    h.   *acara minum Japanese green tea (sado),*

    i.   *klub olahraga anak-anak,*

    j.   *merangkai bunga,*

    k.   *membuat prakarya untuk anak-anak,*

    l.   *mendengarkan cerita,*

    m.   *belajar bahasa Jepang dll.*

Sekali dalam setahun diadakan pameran seluruh hasil karya tiap-tiap kelas di pusat kebudayaan City Hall.

Untuk orang tua yang masih sibuk sampai jam sekolah anak-anak berakhir, disediakan penitipan anak-anak Shougakkou (SD), yaitu gakudou, sampai pukul enam sore. Sebelum kegiatan gakudou dimulai (biasanya bermain) setiap anak diajak menyelesaikan pekerjaan rumahnya masing-masing oleh pembimbing gakudou. Setelah selesai, mereka boleh bermain menggunakan berbagai fasilitas yang tersedia, seperti: ruang bermain anak, perpustakaan dan ruang olahraga. Semua ruang dilengkapi fasilitas yang lengkap dan menarik. Pada waktu tertentu diadakan kegiatan khusus seperti membuat prakarya dengan mendatangkan guru atau instruktur yang diundang oleh pihak Community Center.

Tulisan ini telah mempresentasikan Community Center sebagai kegiatan belajar masyarakat yang tinggal di Jepang, termasuk warga asing. Dari kegiatan yang ada di Community Center, banyak sekali ilmu yang bisa diambil. Sangat disayangkan jika tempat-tempat seperti community center dilewatkan oleh masyarakat Indonesia selama mereka tinggal di Jepang. Community Center bisa dijadikan tempat terdekat untuk meningkatkan keterampilan dan kemampuan diri. Tentunya dapat menjadi alternatif bagi para ibu rumah tangga yang ingin mencari kegiatan bermanfaat dan bersosialisasi dengan tetangga orang Jepang. Semoga ilmu dan pengalaman yang diperoleh selama tinggal di Jepang dapat secara efektif meningkatkan kemampuan diri dan dapat diaplikasikan di pusat kegiatan belajar masyarakat di Indonesia.

Keywords: Miyatake Community Center, Nomi–Shi, Ishikawa.

Category: *Humanities, Language and Culture*

Presentation Media: Oral Presentation

Selected References

[1] Nomi City. (2010) " Petunjuk Kelas Belajar di Nomi-City", Ishikawa, Japan.

[2] Ella Yullaelawati, Ph.D. , DR. Mustofa Kamil, "Laporan Perjalanan ke Jepang : Studi Banding Kominkan 公民館", 2008

[3] DR. Mustofa Kamil. "Mengembangkan Pendidikan Non-formal melalui PKBM", 2007.

[4] *Miyatake Community Center,* http://www.city.nomi.ishikawa.jp/ (Accessed at July 19, 2010).

WasabiCabe.com: the Portal Site for the Promotion of Indonesia-Japan Relation

Hendry Litou[1]

[1] Puratama, G.K., Tokyo, Japan

hendry@puratama.com

Abstract. *The objective of this paper is to introduce the development of WasabiCabe.com, which is a social, cultural, and business related video-based information provider site in Indonesian and Japanese language (and with some English information also). The objectives of the development of WasabiCabe.com are to provide a media to introduce and promote things related to Japan and Indonesia, and to create an internet community that may promote Indonesia-Japan relation. In order to realize the first objective, WasabiCabe.com provides short videos of Indonesian language and Japanese language study materials, cultural related contents, product related contents, sightseeing places, people, etc. In order to help users to search the videos, category function is used so that users can search videos by navigating the categories provided in the site. Videos can be tagged into one or more categories. New categories can be created, and the existing category names can be changed if necessary. For example, the current "Professors in Japan" category which consists of videos about information of professors in Japan who are willing to accept post-graduate students from Indonesia, only has "Professors in Informatics" as its subcategory. New subcategory can be created when a new video that does not belong to this subcategory is uploaded. Currently, WasabiCabe.com has 6 top level categories with 206 subcategories. Since this site is not an internet video sharing site, such as YouTube, etc., all videos are produced by the managing company. Currently, there are more than 800 short videos available on this site, and hopefully may have more than 1,000 videos by the end of year 2010. On the other hand, in order to realize the second objective, this site is developed to play the role of a social network site (SNS). So, just like many other social network sites, registered members can add other members as their friends, and communicate with each others on WasabiCabe.com. Registered members can also join groups available in the site. The purpose is to allow the creation of internet community that may foster Indonesia-Japan relation. Currently, WasabiCabe.com has only less than 130 members, and no research has been done concerning the social interactions in this site. WasabiCabe.com was released on February 2010. Counting from February 2010, WasabiCabe.com has an average of 210 unique IP access per day. Though the number is still a small number, it is enough to show that this site has started to function as a portal site. This site is available at http://wasabicabe.com*

Keywords: portal site, social network, language study materials, internet community

Category: *Humanities, Language and Cultures*

Presentation Media: Oral Presentation

Selected References
Book

[1] Rosch, E. (1999), "Principles of Categorization." *Concepts: Core Reading*, Margolis, E. et al (ed), The MIT Press, Massachusetts, 189-206.

Journal

[2] Ellison, N.B., Lampe, C., Steinfield, C. (2009). "Social network sites and society: current trends and future possibilities." *Interactions*, 16(1), 6-9.

Self-Injurious Behavior among College Students in Indonesia and Japan

Fiona Tresno[1], Yoshimi Ito[1]

[1] Nagoya University, Graduate School of Environmental Studies

Email address: tresno.fiona@b.mbox.nagoya-u.ac.jp

Abstract. *Objectives: Two studies reported here aimed to examine the prevalence of self-injurious behavior among college students population in Indonesia and Japan. The second aim was to evaluate the predicted risk factors, whether self-injury individuals differ on the level of mood regulation expectancies, depression level, and childhood trauma. Method: Participants were 314 Indonesians and 315 Japanese at an urban university, completed self-report questionnaires of Deliberate Self-Harm Inventory, Negative Mood Regulation Scale, Center for Epidemiological Studies-Depression, and The Child Abuse and Trauma Scale. Results: Among Indonesian sample, 38% (n=118) had injured themselves (72% female). Cutting the skin with sharp objects was the most reported self-injury method (15%), followed by punching self (12%). In Japan, 11% (n=33) self-injurers were identified (55% female). Severe scratching was endorsed by 23% of participants, followed by cutting the skin (19%). In both countries, comparison of self-injury and non-self-injury group showed that the self-injury group indicated more childhood trauma, less expectancies in negative mood regulation, and more depressed than non-self-injury group. Conclusion: Consistent with the studies in the West, results in this study suggested poor mood regulation, depression, and childhood trauma as important predictor of self-injurious behavior in Indonesia and Japan.*

Keywords: self-injury, depression, childhood trauma, mood regulation.

Category: *Humanities, Language and Cultures*

Presentation Media: Oral Presentation

Selected References

Books

[1] Alderman, T. (1997). *The scarred soul: Understanding and ending self-inflicted violence.* Oakland: New Harbinger; 1997.

Journals

[2] Gratz, K. (2001). Measurement of deliberate self-harm: Preliminary data on the deliberate self-harm inventory. *Journal of psychopathology and behavioral assessment*, *23*(4), 253-263.

[3] Matsumoto, T., Azekawa, T., Yamaguchi, A., Asami, T., & Iseki, E. (2004). Habitual self-mutilation in Japan. *Psychiatry and clinical neurosciences, 58*, 191-198.

[4] Muehlenkamp, J. J., & Gutierrez, P. M. (2004). An investigation of differences between self-injurious behavior and suicide attempts in a sample of adolescents. *The American association of suicidology, 34* (1), 12-23.

[5] Ross, S. & Heath, N. (2002). A study of the frequency of self-mutilation in a community sample of adolescents. *Journal of youth and adolescents, 31*(1), 67-77.

Hubungan Komunikasi OFL (*offline*) dan ONL (*online*) dalam rangka Mewujudkan Perpolisian Masyarakat di Indonesia: Studi Kasus pada Senkom Mitra Polri DIY dan Masyarakat Kota Matsuyama, Jepang

Atus Syahbudin[1, 2, 3], Tarjono[3], Suwarjo[4]

[1] Mahasiswa Pascasarjana Universitas Ehime, 3-5-7 Tarumi, Matsuyama 790-8566, Japan.
[2] Dosen Universitas Gadjah Mada (UGM), Yogyakarta [3] Pemerhati Polmas
[4] Dosen FISIPOL Universitas Widya Mataram Yogyakarta (UWMY)
Alamat Email: [1] syahbudin_atus@yahoo.com dan [4] uwmy@yahoo.co.id.

Abstrak. Kemitraan bersama masyarakat menjadi strategi Polri saat ini dalam rangka mengurangi rasa takut atau was-was, meningkatkan kualitas hidup serta mewujudkan keamanan dan ketertiban masyarakat (kamtibmas). Penerapan model perpolisian masyarakat (polmas) dan pembentukan Forum Kemitraan Polisi Masyarakat (FKPM) diharapkan dapat mengoptimalkan semua potensi guna mendeteksi secara dini penyakit masyarakat (Anonim, 2008; Yulistia, 2010). Disamping itu, komunitas lainnya yang juga berpotensi menumbuhkan daya tangkal, meningkatkan kepercayaan masyarakat terhadap polisi dan mendukung polisi bekerja secara preventif terus diberdayakan sesuai fungsi polmas (Yulistia, 2010). Hal ini tentu saja akan memperbaiki citra polisi di tengah kinerjanya yang kini terus disorot. Senkom Mitra Polri DIY merupakan salah satu wadah berkumpulnya masyarakat berdasarkan kesamaan kepentingan, hobi dan keahlian. Pada awalnya organisasi ini memberikan bantuan komunikasi kepada korban gempa Yogyakarta. Setelah berakhirnya masa tanggap darurat, kepedulian dan jejaring komunikasinya beralih guna pemeliharaan kamtibmas di lingkungan para anggotanya masing-masing (Anonim, 2007). Model komunikasi yang dibangun antar anggota Senkom Mitra Polri dan mekanisme hubungan dengan polisi menarik untuk dicermati dalam kaitannya pemahaman hubungan yang ideal antara polisi dan masyarakat. Sebagai pembanding, hubungan komunikasi antara masyarakat Kota Matsuyama, Jepang dengan polisi setempat juga dianalisa. Hal ini mengingat kepolisian Jepang dengan polmasnya dapat dikatakan lebih maju dan menempatkan polisi sebagai penegak hukum modern (Arianto, 2006). Penelitian dilaksanakan pada bulan Januari-September 2008 di DIY, Indonesia dan Januari-Juni 2010 di Kota Matsuyama, Jepang. Data diperoleh dengan menggunakan metode observasi dan pengamatan langsung di lapangan. Wawancara singkat juga dilakukan dengan para penggiat Senkom Mitra Polri DIY dan warga masyarakat Kota Matsuyama (Abbas dkk.). Studi ini menyimpulkan bahwa Senkom Mitra Polri DIY merupakan salah satu komunitas mitra polisi yang cukup aktif berperan serta memelihara kamtibmas melalui kombinasi komunikasi OFL dan ONL. Komunikasi OFL atau offline dilakukan dengan tatap muka antar anggota dan dengan polisi secara intensif. Kegiatannya berupa pertemuan rutin dan/atau kunjungan ke Babinkamtibmas di tingkat kelurahan hingga koordinasi di tingkat Polda. Selain itu, para anggota Senkom Mitra Polri juga ikut melaporkan kecelakaan atau kejadian menonjol lainnya di jalan raya kepada pos polisi terdekat. Adapun komunikasi ONL atau online adalah komunikasi melalui udara (nirkabel) dengan memanfaatkan handy talky (HT), handphone (HP), telepon rumah, telepon umum maupun website. Dua-tiga kali sehari para anggota Senkom Mitra Polri DIY melaksanakan netting, yakni melaporkan kondisi kamtibmas terkini di sekitar tempatnya berada secara ONL, terutama menggunakan HT. Informasi kamtibmas yang menonjol akan segera diteruskan kepada polisi untuk ditindaklanjuti. Kelancaran komunikasi ONL dengan kepolisian selalu berawal dari komunikasi OFL terlebih dahulu. Melalui komunikasi OFL yang intensif, para anggota Senkom Mitra Polri dapat mengenal dan/atau dikenal oleh polisi. Suasana keakraban, kesetaraan, saling memahami dan menghargai menjadi awal munculnya rasa saling mempercayai. Para anggota Senkom Mitra

Polri pun tidak takut dan canggung lagi berkomunikasi dengan polisi. Keterbukaan polisi juga timbul dengan keikhlasannya memberikan data diri, seperti: nomor telepon atau alamat rumah yang dapat dihubungi sewaktu-waktu bila muncul kejadian menonjol. Pada kondisi seperti inilah anggota Senkom Mitra Polri merasa nyaman apabila komunikasi OFL terus berlanjut pada komunikasi ONL. Kebutuhan akan kenyamanan berkomunikasi seperti ini terlihat berbeda dengan pola komunikasi antara masyarakat Kota Matsuyama dan polisi setempat. Budaya jujur dan disiplin yang telah menjadi pola hidup sejak kecil masyarakat Kota Matsuyama sangat membantu pelaksanaan tugas-tugas kepolisian berjalan dengan baik dan lancar. Sebaliknya anggota masyarakat senantiasa mempercayai kinerja polisi beserta peralatan modernnya, seperti CCTV dalam rangka menyelesaikan setiap permasalahan kamtibmas. Akhirnya, bagi Indonesia yang belum sekondusif Kota Matsuyama, kombinasi komunikasi ONL dan OFL menjadi pilihan guna meningkatkan hubungan timbal balik yang intensif antara masyarakat dan polisi. Dengan demikian, keakraban, tingkat partisipasi dan kepercayaan masyarakat kepada polisi dapat semakin meningkat.

Kata kunci: perpolisian masyarakat, Senkom Mitra Polri, komunikasi, kamtibmas

Kategori: *Humanities, Language and Culture*

Presentasi: Presentasi Oral

Daftar Pustaka

[1] Abbas, D.G., E. Mathias, A.R.J. Montes, P. Mundy, J.P. Ronquillo and T. Willard (1995). *Recording and Using Indigenous Knowledge: A Manual.* International Institute of Rural Recontruction (IIRR), Philippines.

[2] Anonim (2007). *Profil Senkom Mitra Polri Yogyakarta*. Senkom Mitra Polri, Yogyakarta.

[3] Anonim (2008). Peraturan Kepala Kepolisian Negara Republik Indonesia No. 7 Tahun 2008 tentang Pedoman Dasar Strategi dan Implementasi Pemolisian Masyarakat dalam Penyelenggaraan Tugas Polri. http://www.komisikepolisianindonesia.com/secondPg.php?cat=hukum&id=642> (Diakses pada: 30 Juli 2010).

[4] Arianto, P. (2006). *Community Policing* sebagai Gaya Perpolisian Masyarakat/Polmas (Suatu Tinjauan dalam Upaya Pencegahan Kejahatan. http://www.lcki.org/community-policing-sebagai-gaya-perpolisian-masyarakat--polmas.html.> (Diakses pada: 30 Juli 2010).

[5] Yulistia, S.Y. (2010). *Pemolisian Masyarakat*. Pelatihan Senkom Mitra Polri III, Jakarta.

Keberadaan *Qualifier* dalam Konstruksi Kalimat

Roni
FBS Universitas, Negeri Surabaya
Fakultas Sastra, Universitas Nagoya
Email address: ronniewae@yahoo.com

Abstrak. *Qualifier adalah kategori gramatikal yang bertugas untuk memodifikasi konstituen utama dalam konstruksi predikat, khususnya predikat verba. Dengan kata lain, qualifier merupakan salah satu modifier dalam konstruksi kalimat.Teori qualifier yang dibuat oleh Lehmann (1973) ini didasarkan pada urutan kata dan morfem, sebagai kelanjutan tipologi bahasa urutan kata dan morfem yang dibuat oleh Greenberg (1963). Dengan demikian keberadaan tipologi bahasa Lehmann tidak bisa dilepaskan dari tipologi bahasa Greenberg.*

Konstituen qualifier dalam bahasa Indonesia sebagian besar sudah dibahas oleh Sudaryanto (1983) dalam bukunya Predikat-Objek dalam Bahasa Indonesia, Keselarasan Pola-Urutan. Sedangkan dalam bahasa Jepang khususnya qualifier dalam konstruksi predikat verba sudah dibahas oleh Roni (2008) dalam tulisannya "Nihongo no Dooshi Qualifier" dalam jurnal Nagoya Daigaku Kokugo KokuBungaku Vol 101 hal 82-100. Contoh konstituen qualifier dalam bahasa Indonesia dan bahasa Jepang misalnya interogatif (apakah/-ka), negatif (tidak; -nai), potensial (dapat/eru; boleh/-temoii); desiderative (harus/-nakerebanaranai; ingin/-tai), dan sebagainya.

Tentang keberadaan modifier dalam konstruksi predikat ini, pandangan Lehmann bertentangan dengan pandangan ahli logika yang melahirkan tatabahasa generatif. Dalam pandangan para ahli tatabahasa generatif, kategori gramatikal seperti dicontohkan di atas dikeluarkan dari konstruksi klausa/kalimat. Misalnya dalam kalimat Kakekku ingin minum teh pahit kata ingin dikeluarkan dari klausa. Jadi kalimatnya menjadi Kakekku minum teh pahit. Dan kalimat atau klausa ini menjadi modifier terhadap kata ingin. Berbeda dengan tatabahasa generatif, dalam teori qualifier akan memosisikan kata ingin menjadi modifier terhadap konstituen utama dalam predikat tersebut, yaitu terhadap verba minum. Tulisan ini akan menjelaskan mengapa qualifier mempunyai tugas memodifikasi konstituen utama dalam konstruksi predikat dan bagaimana posisinya dalam keseluruhan konstruksi kalimat berdasarkan tulisan Lehmann dan Greenberg, kemudian memperhatikan pula tulisan Sudaryanto tentang qualifier dalam bahasa Indonesia dan tulisan Roni tentang qualifier dalam bahasa Jepang.

Greenberg menyusun teorinya berdasarkan urutan kata dan morfem sebagi berikut. Pertama, menggunakan urutan fungsi sintaksis yaitu subjek (S), predikat (P), dan objek (O). Dalam hal ini predikat secara antar-bahasa diisi oleh kategori sintaksis verba (V). Oleh karena itu selain ada formasi SPO juga ada formasi SVO. Keduanya merujuk ke hal yang sama. Berdasarkan urutan ketiga konstituen ini bahasa-bahasa di dunia dibedakan menjadi bahasa SVO, SOV, VSO, VOS, OSV, dan OVS. Tulisan ini hanya berkonsentrasi pada dua yang disebutkan di awal yaitu SVO yang diwakili bahasa Indonesia, dan SOV yang diwakili oleh bahasa Jepang.

Kedua, menggunakan urutan nomina (N) dan adposisi (Ad), serta nomina (N) dan adjektifa (A) dalam konstruksi frasa. Berdasarkan hal ini bahasa-bahasa di dunia dibedakan menjadi bahasa yang mempunyai frasa dengan urutan N-Ad dan Ad-N, serta N-A dan A-N. Adposisi dibedakan menjadi dua yaitu seperti yang terjadi dalam bahasa Indonesia disebut dengan preposisi. Misalnya adposisi di dalam frasa di pasar berada sebelum nomina. Sedangkan, adposisi yang berada sesudah nomina seperti dalam bahasa Jepang, misalnya kata de dalam frasa ichiba de 'di pasar' disebut dengan postposisi.

Selanjutnya, Lehmann menganggap bahwa subjek (S) dalam bahasa tidak begitu penting secara antar-bahasa. Oleh karena itu dihilangkan. Hal ini bisa dilihat dalam bahasa Jepang. S sering tidak diucapkan dalam kalimat percakapan bahasa Jepang. Dengan demikian, bahasa dibedakan menjadi dua saja yaitu bahasa VO dan bahasa OV. Dalam konstruksi frasa nomina yang menjadi modifier tidak hanya adjektif saja. Di sini Lehmann menambahkan bahwa genitive (G) dan klausa relative (Rel) juga memodifikasi terhadap nomina (N).

Dalam konstruksi SVO, posisi S dan O diisi oleh nomina. Berdasarkan deskripsi di atas nomina dimodifikasi oleh adjektifa, genetif, dan klausa relative. Bagaimana dengan verba, kenapa tidak ada modifiernya. Untuk merespon inilah Lehmann mengusulkan adanya qualifier yang bertugas memodifikasi verba dalam konstruksi frasa predikat.

Dengan demikian dapat disimpulkan bahwa keberadaan qualifier yang bertugas memodifikasi verba adalah untuk mengimbangi keberadaan modifier dalam frasa nomina yang mengisi fungsi sintaksis S dan O. Jadi, istilah qualifier adalah modifier khusus yang hanya merujuk pada modifier yang berada dalam konstruksi frasa predikat.

Kata kunci: qualifier, modifier, predikat

Kelompok Bidang Keilmuan: *Humanities, Language and Cultures*

Media Presentasi: Presentasi oral

Daftar Pustaka

Buku

[1] Sudaryanto (1983) *Predikat-Objek dalam Bahasa Indonesia, Keselarasan Pola-Urutan.* Penerbit Djambatan

Jurnal

[2] Lehmann, WP. (1973) "A Structural Principle of Language and Its Implications" in *Language* Vol. 49 No. 1

[3] Roni (2008) "Nihongo no Dooshi Qualifier" in *Nagoya Daigaku Kokugo Kokubungaku* Vol. 101. November 2008

Pemerolehan Subordinator "Tameni" dan "Youni" Yang Menyatakan Tujuan Pada Pembelajar Bahasa Jepang Orang Indonesia

Dewi Kusrini

Osaka Prefecture University

Email address: dewi@lc.osakafu-u.ac.jp

Abstrak. *Jarak bahasa, dalam hal ini ada tidaknya padanan ungkapan pada bahasa ibu dan bahasa sasaran dikatakan menjadi salah satu faktor sulit atau tidaknya pembelajar menguasai bahasa sasaran. Sehingga, diperkirakan 2 subordinator dalam bahasa Jepang yaitu "tameni" dan "youni" yang menyatakan tujuan pada kalimat majemuk bertingkat, dapat dikuasai lebih cepat oleh pembelajar orang Indonesia daripada pembelajar orang China. Dikarenakan bahasa China hanya memiliki satu padanan subordinator untuk "tameni" dan "youni" pada kalimat tersebut, sedangkan bahasa Indonesia memiliki dua padanan subordinator yang sama dengan bahasa Jepang, yaitu " untuk" untuk "tameni" dan "supaya/agar" untuk "youni".*

(1) Nihongo wo benkyou suru <u>tameni</u> nihon e ryuugaku shimashita.

(Saya pergi belajar ke Jepang <u>untuk</u> belajar bahasa Jepang.)

(2) Umaku nihongo ga hanaseru <u>youni</u> mainichi kunren shite imasu.

(Saya berlatih setiap hari <u>agar/supaya</u> bisa berbicara bahasa Jepang dengan lancer.)

Dari penelitian Inagaki (2009), diketahui bahwa pembelajar orang China yang sudah di level atas dan juga tinggal di Jepang selama 5 tahun pun ternyata masih belum dapat menguasai pemakaian kedua subordinator tersebut dan ditemukan kecenderungan penggunaan "tameni" yang berlebihan.

Penelitian ini bertujuan untuk mengetahui apakah pembelajar orang Indonesia memang lebih mudah memahami dan membedakan penggunaan subordinator "tameni" dan "youni dibanding pembelajar orang China dikarenakan faktor jarak bahasa yang lebih dekat daripada bahasa China.

Responden adalah pembelajar orang Indonesia yang belajar bahasa Jepang di universitas di Indonesia sebanyak 69 orang. Tingkat 2 sebanyak 32 orang dan tingkat 3 sebanyak 37 orang. Semua responden memiliki kemampuan bahasa Jepang level 3.

Objek yang diteliti adalah subordinator "tameni" dan "youni" dalam kalimat majemuk bertingkat yang menyatakan tujuan. Untuk membandingkan pemerolehan kedua subordinator tersebut pada pembelajar orang China dengan pembelajar orang Indonesia, maka alat tes yang digunakan sama mengacu pada tes dibuat oleh Inagaki (1999) yaitu tes tertulis 4 alternatif pilihan (preference test) sebanyak 23 soal, 18 soal utama dan 5 soal pengecoh.

Dari hasil analisa data, diketahui bahwa ;

a. Rata-rata 95% pembelajar menjawab dengan benar untuk subordinator "tameni" dan "youni" pada kalimat yang klausa subordinatifnya menyatakan keadaan yang dapat dikendalikan maupun tidak oleh pembicara.(pembelajar orang China, 98%)

(1) Mokutekichi ni hayaku tsuku <u>tameni/youni</u> tokkyuu ni notta.

(2) Kireini naru <u>tameni/youni</u> maishuu esute ni kayotte iru.

(3) Futoranai <u>tameni/youni</u> daietto wo shiteimasu.

b. Rata-rata 73% pembelajar menjawab dengan benar untuk subordinator "tameni" pada kalimat yang klausa subordinatifnya menyatakan kehendak yang dapat dikendalikan oleh pembicara. (pembelajar orang China, 78%)

(4) Nihongo wo benkyou suru <u>tameni</u> nihon e ryuugakushita.

(5) Ima, shinsha wo kau <u>tameni</u> okane wo tamete imasu.

(6) Shokunin ni naru <u>tameni</u> mainichi kunren shite iru.

c. *Rata-rata 54% pembelajar menjawab dengan benar untuk subordinator "youni" pada kalimat yang klausa subordinatifnya menyatakan keadaan yang tidak dapat dikendalikan oleh pembicara. (pembelajar orang China, 75%)*
(7) Mokutekichi ni hayaku tsukeru youni tokkyuu ni notta.
(8) Umaku nihongo ga hanaseru youni mainichi kunren shite imasu.
(9) Ame ga futtemo komaranai youni kasa wo motte itta.

d. *Rata-rata 43% pembelajar menjawab dengan benar untuk subordinator "youni" pada kalimat yang klausa subordinatifnya menyatakan keadaan yang tidak dapat dikendalikan oleh pembicara dan subjek pada klausa utama dan subordinatifnya yang berbeda. (pembelajar orang China, 64%)*
(10) Suupu ga samenai youni futa wo shita.
(11) Tegami ga hayaku tsuku youni sokutatsu de dashita.
(12) Kodomo ga takusan taberu youni ryouri wo kufuu shimasu.

Dari ke-4 tipe soal diatas, pada soal tipe b, pemahaman secara implisit subordinator "untuk" masih belum dapat dipetakan pada "tameni" secara maksimal, begitu pula dengan "supaya/agar" pada "youni" seperti pada soal tipe c dan d. Hal ini dikarenakan pembelajar belum mengetahui batasan-batasan pemakaian subordinator baik dalam bahasa Indonesia maupun bahasa Jepang.

Dari penelitian ini, dibandingkan dengan responden pembelajar orang China level atas dan tinggal di Jepang dalam penelitian Inagaki (2009), responden pembelajar orang Indonesia level menengah yang belajar di Indonesia dan belum pernah tinggal di Jepang, diketahui bahwa padanan yang terdapat pada bahasa Indonesia masih belum dapat diaktifkan secara maksimal dalam membedakan penggunaan subordinator "tameni" dan "youni", sehingga prosentase ketepatan memilih kedua subordinator tersebut masih rendah. Dan dapat dikatakan bahwa faktor lingkungan dan lamanya belajar lebih berpengaruh daripada faktor jarak bahasa ibu dan bahasa sasaran.

Kelebihan pengetahuan bahasa Indonesia masih perlu dimaksimalkan untuk menjadi faktor yang menguntungkan bagi pembelajar orang Indonesia yang tinggal dan belajar di Indonesia. Untuk itu diperlukan upaya pemberian input secara eksplisit dan terstruktur mengenai batasan penggunaan yang membedakan "tameni" dan "youni" dengan mentransfer dari ilmu tata bahasa Indonesia.

Kata kunci: pemerolehan, tameni, youni, jarak bahasa, bahasa ibu, bahasa sasaran

Kategori: *Humanities, Language and Cultures*

Media Presentasi: Oral Presentation

Daftar Pustaka:

[1] Alwi, Hasan et al (2003) *Tata Bahasa Baku Bahasa Indonesia edisi ketiga,* Balai Pustaka, Jakarta.

[2] Inagaki, Shunji (2009) "Chuugokugo wo Bogo to Suru Joukyuu Nihongo Gakushuusha ni yoru Mokuteki wo Arawasu "tameni" to "youni" no Shuutoku*" Nihongo Kyouiku* 142, 44-54.

[3] Ozeki, Hiromi (2010) *Nihongo wo Oshieru tame no Dainigengo Shuutoku Riron Nyumon*, Kuroshio shuppan, Tokyo.

[4] Shibuya, Katsumi (2001) "*Gakushuusha no Bogo no Eikyou*" dalam "*Nihongo Gakushuusha no Bunpou Shuutoku*" oleh Noda Hisashi, Sakoda Kumiko, Shibuya Katsumi, Kobayashi Noriko Taishukan Shoten, Tokyo.

Ekspresi Waktu *'Made'* dan *'Madeni'* dalam Bahasa Jepang, Dilihat dari Jenis Predikat Pada Klausa Pertama

Teguh Setia Anugeraha

Osaka University. Address: Osaka-fu, Minoh-shi, Sakura 1-5-1-303

Email address: jpteg@yahoo.co.jp

Abstrak. *Pada saat penulis mempelajari bahasa Jepang di Universitas, selama itu pula penulis tidak tahu perbedaan 'made' dan 'madeni' dalam bahasa Jepang, karena tidak pernah diajarkan langsung mengenai perbedaannya. Setelah melakukan survey, ternyata banyak pembelajar yang berbahasa Ibu bahasa Indonesia yang tidak bisa membedakan 'made' dan 'madeni'. Adapun penelitian ini betujuan untuk memperjelas perbedaan 'made','madeni' dalam bahasa Jepang.*

Pada penelitian ini diketahui bahwa pada penelitian terdahulu[1], 'made' dan 'madeni' dalam bahasa Jepang, memiliki ketentuan penggunaan yaitu dibedakan berdasarkan predikat pada klausa pertama. Predikat pada kalimat 'made' menunjukkan makna pekerjaan atau kejadian atau situasinya dapat berlangsung lama, dari segi aspek, dapat dikategorikan kedalam aspek imperfektif, dalam penelitian ini dikategorikan ke dalam kejadian tidak berbatas / unlimited. Seperti contoh kalimat di bawah ini.

（1）3時まで待ちます。 （作例）

（2）肉がやわらかくなるまで、中火で煮ます。 （日本語文型辞典：546）

Sedangkan predikat pada 'madeni', pekerjaan atau kejadian atau situasinya bukanlah hal yang berlangsung lama, atau memiliki makna aspek perfektif, dalam penelitian ini dikategorikan ke dalam kejadian berbatas / delimited. [2] Seperti contoh kalimat di bawah ini.

（3）レポートは来週の木曜日までに提出してください。

（4）兄が帰るまでに食事を済ませた。

Akan tetapi, ketentuan diatas tidak dapat diaplikasikan pada contoh kalimat berikut ini.

（5）学校に戻るまでにまだ二週間もあった。

（ハリー　ポッターと炎のゴブレット：33）

（6）そのうえで「ご活動の幅をさらに大きく広げていただくまでには、さらなる時間が必要」と指摘した。

（毎日新聞、2010.02.05）

---

[1] Guruupu Jamashii (1998), Nihongo Kijutu Bunpo kenkyukai (2008), Kudo Mayumi.(1995), Kuno Susumu. (1973), Teramura Hideo (1983)

[2] Istilah delimitedness mengacu pada Mihara(2004)

Contoh tersebut diatas adalah contoh aktual, yang didapat dari artikel koran dan novel. Predikat pada contoh (6) yaitu あった *dan (7) yaitu* 必要, *menujukkan kejadian tidak berbatas (unlimited), tetapi menggunakan madeni. Hal tersebut tidak dapat dijelaskan pada penelitian terdahulu. Dan ternyata madeni pada kalimat tersebut dapat digantikan dengan kata made. Sehingga dapat disimpulkan pada jenis kalimat di atas made dan madeni dapat saling menggantikan. Dalam penelitian ini, didapat bahwa jenis predikat yang dapat saling menggantikan adalah predikat yang memiliki makna 'perlu'.*

Kata kunci: 'made', 'madeni', delimitedness

Kategori: *Humanities, Language and Cultures*

Media Presentasi: Oral presentation

Daftar Pustaka

Buku

[1] Guruupu Jamashii.(1998). "Kyoshi to Gakushusha no Tame no Nihongo Bunpo Bunkei Jiten". Kuroshio Shuppan.

[2] Nihongo Kijutu Bunpo kenkyukai.(2008). "Gendai Nihongo Bunpo 6". Kuroshio Shuppan. Kudo Mayumi.1995."*Asupekuto Tensu Taikei to Tekusuto – Gendai Nihongo no Jikan Hyogen –* "Hitsuji Shobo

[3] Kuno Susumu. (1973)."*made,*"*madeni*"*to*"*madede*". Dalam *Nihongo Bunpo Kenkyu.*.Taishukan.

[4] Mihara Ken'ichi.(2004). "Asupekuto Kaishaku to Togo Gensho".Shohakusha.

[5] Teramura Hideo.(1983)."Jikanteki Gentei no Imi to Bunpoteki Kino".Dalam "Teramura Ronbunshu I-Nihongo Bunpohen-(1993)".Kuroshio Shuppan.

INTERDISCIPLINARY STUDIES

Semantic Verbal Fluency for Indonesian Speaking Participants

Donny Hendrawan[1,2] and Takeshi HATTA[3]

[1] Graduate School of Environmental Studies, Nagoya University, Japan

[2] Faculty of Psychology, University of Indonesia, Depok – Indonesia

[3] Kansai University of Walfare Sciences, Japan

Email address: dhendrawan@gmail.com

Abstract. *Semantic verbal fluency task is one of the executive function tests administered individually to encourage a participant to produce as many words that come to his or her mind as possible, spoken or written, within a restricted category and determined lapse of time. Several studies reported that the performance of verbal fluency task is strongly influenced by socio-culture and language aspects (Hendrawan & Hatta, 2010). Animal naming is the most popular category used in research across languages. Studies of bilingualism mentioned that the number of words produced by participants when it came to animal were not significantly different between French and English (Roberts & Dorze, 1997, 1998). Moreover, English and Spanish speakers obtained similar scores on animal fluency (Acevedo et al., 2000). Nevertheless, this category is not yet proved to be representative of all linguistic and cultural backgrounds. For instance, Spanish speakers generated the fewest number of animal names in comparison to Chinese and English speakers, while Vietnamese speakers generated the biggest number of animal names, since the length of the words for animal names are longer in Spanish and shorter in Vietnamese (Kempler et al., 1998). Therefore, linguistic and ethnic background considerations are very important when developing the appropriate verbal fluency task for a specific country. This study sought to investigate the possibility of animal naming to be employed as standardized semantic fluency category for Indonesian language. 211 male and female students from public and private universities in Indonesia with different academic backgrounds participated in this study. Result showed that the animal naming was considered to be the best category for Indonesian that is concordance with many other previous studies. In addition, sex difference, academic background, and university status were not associated with semantic fluency performance. Finally, the hierarchical regression coefficients for estimated IQ, that were statistically significant in the first step of analysis, were not significant for the fluid intelligence on the second when the creativity variable was entered, which suggested a partial mediation of estimation IQ in semantic fluency performance by the creativity variable. This study is expected to be a good starting point to explore further many aspects of verbal fluency in Indonesian language.*

Keywords: Indonesian, semantic fluency, executive function, language, culture

Category: *Humanities, Language and Cultures*

Presentation Media: Oral Presentation

Selected References

Journals

[1] Acevedo, A., Loewenstein, D. A., Barker, W. W., Hardwood, D. G., Luis, C., Bravo, M., et al. (2000). Category fluency test: Normative data for English- and Spanish-speaking elderly. *Journal of the International Neuropsychological Society*, **6**, 760–769.

[2] Hendrawan, D., & Hatta, T. 2010. Evaluation of stimuli for development of the Indonesian version of verbal fluency task using ranking method. *Psychologia*, **53**, 14 – 26.

[3] Roberts, P. M. & Dorze, G. L. (1997). Semantic organization, strategy use, and productivity in bilingual semantic verbal fluency. *Brain and Language*, **59**, 412 – 449.

[4] Roberts, P. M. & Dorze, G. L. (1998). Bilingual aphasia: semantic organization, strategy use, and productivity in semantic verbal fluency. *Brain and Language*, **65**, 287 – 312.

[5] Kempler, D., Teng, E. L., Dick, M., Taussig, I. M., & Davis, D. S. (1998). The effects age, education, and ethnicity on verbal fluency. *Journal of International Neuropsychological Society*, **4**, 531 – 538.

The State and Undocumented Migrant Workers:
Case Studies of Indonesian Undocumented Migrant Workers in Korea

Nidya Kartikasari

National Graduate Institute for Policy Studies (GRIPS), Tokyo, Japan

doc08010@grips.ac.jp

Abstract. *One of the major phenomena in the developed countries is the lack of labor force that is willing to work in the low-skilled jobs industry. This situation attracts workers from developing countries to work in developed countries both legally or illegally. As the result, many countries come up with a scheme to import and regulate foreign labors. How does a government respond to the presence of undocumented immigrants seeking for work? How do host country's policies affect the undocumented migrant workers? These are the basis questions of this research paper.*

This paper aims to better understand the problematic role of the state in the formulation of immigration policies related with the presence of undocumented migrant workers. The first part of the paper analyzes the evolution of South Korean government's responses towards the presence of undocumented migrant workers. In early 1990s South Korean (henceforth Korea) has created Industrial and Technical Training Program (ITTP) which was modeled after Japanese policy in order to solve the labor shortage problem. However, ITTP denied trainees from decent benefit and made many trainees turn to work illegally as undocumented workers. Korean civil society and labor union united to protest Korean government for not upholding the human rights of foreign workers under ITTP. The situation prompted a debate on what kind of immigration policy suitable for Korean interests. The main challenge for Korean government was to come up with a policy that strikes the balance between business interests and upholding the human rights for migrant workers. In 2004, Korean government started to implement Employment Permit System (EPS) by signing Memorandum of Understanding with 15 sending countries, including Indonesia. During the transition period from ITTP to EPS, Korean government legalized undocumented workers thus the number of undocumented workers reduced significantly. Currently, Korean civil society changed their stance to be more cooperative with Korean government to improve the human rights condition of foreign workers.

With particular reference of Indonesian undocumented workers, the second part of the paper discusses how the policies made by Korean government affected the life of undocumented workers and how those undocumented workers responded to the government policies towards them. By using ethnographic research method, this research aims to understand the struggle of undocumented workers to survive under the policies of foreign government. Indonesian workers formed "paguyuban", solidarity of Indonesian migrant workers based on ethnic/sub-ethnic association, with main purpose to help fellow undocumented workers. As the foundation of paguyuban is based on strong ethnic and sub-ethnic solidarity, inter-paguyuban conflict and group fights often occurred and made Indonesian workers severely divided. During the transition of ITTP to EPS, Indonesian community finally got united for political purpose under Solidarity of Migrants Indonesia (SMI). SMI joined Korean civil society and labor union to fight for legalization of undocumented workers. Korean government granted temporary legalization of undocumented workers that meets requirements and deported some SMI activists that persist with their activisms. Knowing that Korean government against political activism and the migrant conditions has improved, Indonesian community stopped their political activism and turned to be cooperative with

Korean government under the new Indonesian Community in Corea (ICC). This paper found the importance of social networks for the survival of undocumented workers and found that the change of struggle of Indonesian workers in Korea is corresponding with the changes of Korean migrant policy as well as the changes of Korean civil society attitudes towards the government.

Keywords: migration in East Asia, immigration policy, migrant workers.

Category: *Interdisciplinary Studies*

Presentation Media: Oral Presentation

Selected References:

Books

[1] Brettell Caroline B. and James F. Hollifield (2007)*.*, *Migration Theory: Talking across Disciplines*, Routledge, 2nd ed, New York.

Journals

[2] Seol, D.H. (2000), *"Past and Present of Foreign Workers in Korea 1987-2000"*. Asia Solidarity Quarterly 2:6-31.

[3] Lee, Y. W., and Park Hyemee (2005), *"The Politics of Foreign Labor Policy in Korea and Japan",* Journal of Contemporary Asia, 35:2, 143-165.

Internet Sources

[4] Ministry of Justice Republic of Korea, *The First Basic Plan for Immigration Policy 2008-2013.* http://www.immigration.go.kr/HP/IMM/icc/basicplan.pdf (Accessed at June 2, 2010).

[5] Ministry of Justice Republic of Korea, *Korea Immigration Service Statistics 2008.* http://www.immigration.go.kr/HP/IMM/newsimg/statistics2008.pdf (Accessed at June 2, 2010).

Possible Ways to Educate Children about Global Warming

Muhammad Rezza

Graduate School of Environmental Studies, Nagoya University

Email address: echa_102@yahoo.com

Abstract. *Sebagaimana kita ketahui bersama saat ini fenomena global warming atau pemanasan global telah menjadi perhatian dan prioritas utama baik bagi negara- negara maju maupun negara- negara berkembang. Berbagai usaha mengatasi global warming sedang dilakukan baik yang bertujuan untuk jangka pendek maupun untuk jangka panjang dimana kesemuanya itu bermuara pada satu tujuan yaitu apa yang disebut sebagai sustainability. Salah satu usaha utama untuk mencapai sustainability jangka panjang adalah bagaimana mengajarkan anak- anak sebagai generasi masa depan akan pentingnya lingkungan atau mengatasi/beradaptasi dengan global warming. Tujuan utama dari tulisan ini adalah memaparkan usulan mengenai cara–cara yang sesuai untuk mengajarkan anak- anak tentang efek pemanasan global ini, tanpa harus menyebutkan kata "global warming" itu sendiri serta tidak menampilkan data-data angka atau grafik, tidak menampilkan atau menunjukkan secara langsung efek buruk dari global warming, baik yg sekarang sudah nampak maupun hasil prediksi peneletian-penelitian ataupun sumber ilmiah yg lain. Menunjukkan data-data penelitian secara langsung akan berdampak terbentuknya image "susah" dalam benak anak-anak, dan mengenalkan langsung mengenai dampak dan efek buruk global warming ditakutkan dapat berakibat kurangnya rasa optimis dalam jiwa anak akan terciptanya solusi bagi sebuah permasalahn lingkungan.Cara – cara yang tersebut antara lain, misalnya, dapat dimulai dengan mengenalkan bumi dan fungsi atmosfer dengan "analogi sebuah apel", membandingkan bumi dengan matahari dan tata surya lainnya, menerangkan asal kehidupan di bumi, proses kenapa bumi bisa hangat, pengenalan keanekaragaman hayati, dan lain- lain. Usaha – usaha tersebut diharapkan bisa menumbuhkan kepedulian anak terhadap lingkungan dan rasa percaya diri akan kemampuan menjalankan peran aktif dalam menciptakan sustainability. Dan tentu saja, yang juga menjadi sasaran pengajaran adalah bagaimana anak-anak agar bisa mencari tahu sendiri mana tindakan yang peduli lingkungan dan mana yang justru sebaliknya.*

Keywords: global warming, environmental education, environmental problems

Category: *Interdisciplinary Studies*

Presentation Media: Oral Presentation

Selected References

Books

[1] Sumi, A. (1999). *Chikyu ondanka no shinjitsu,* Wedge Press, Tokyo (in Japanese).

[2] Komiyama, H. (1995). *Chikyu ondanka mondai ni kotaeru,* Tokyo University Press, Tokyo (in Japanese).

Conference Proceedings

[3] Ishihara, K., Hatayama, M. (1992). "Gakkou ni okeru chikyu ondanka gakushu nitsuite no teian" *Japan Meteorological Society,* Tokyo, 267.

Information Technology Portfolio Management Framework: Anti-Money Laundering System in Indonesian Bank

Anna Yuliarti Khodijah

E-Business Management, International University of Japan
anna@iuj.ac.jp

Abstract. *Money laundering in Indonesia has been a major problem for the country, costing the country several million dollars each year. However, partly to blame are the inherent problems in the financial system, such as ineffective financial regulations, ineffective law enforcement, and the corruption. The proceeds from criminal activities such as bank fraud, illegal logging, and corruption are easily laundered through this vulnerable financial system.*

It is clear that the current reporting system on suspicious financial transactions through banks to the central bank needs supporting tools, including IT solutions that are widely used in some other countries. These IT solutions aimed at curbing such activities in a recorded banking sector, and therefore offer money launderers no escape from enforcement measures.

The purpose of this study is to review current situation in Indonesia and explore the problems and challenges that the Indonesian government is facing there in terms of Anti-Money Laundering system and propose solutions following IT Portfolio Management, which is a general framework for keeping track of implementation aspects of IT in large organizations and broad government projects.

Indonesia had been in the list of "non-cooperative countries" maintained by international money-laundering watchdog Financial Action Task Force (FATF) from 2001-2006 (Ref. 4). Being on the list, Indonesia is considered a high-risk country in terms of financial transactions. Indonesia has made some attempts to get off the list by adopting a number of measures (Refs. 2, 4, 5). First, Indonesia's anti money laundering law, implemented in 2002 clearly identifies any transaction that can be categorized as money laundering. The law also stipulates that harsh sanctions must be imposed on violators. Indonesia also adopted mutual legal cooperation with other countries regarding money laundering and institutionalized an operable reporting system, known as Suspicious Transactions Reports or STR. This STR system is supposed to report the suspicious financial transactions by all the banks to the central bank or Bank Indonesia.

After consecutive years of Indonesia's infrastructure review by FATF, Indonesia was then finally removed from the FATF blacklist in February 2006. Irrespective of the law being effective since 2002, the number of STR cases, has been increasing in general over the last 10 years or so.

The purpose of this study is to review current situation and explore the problems and challenges that Indonesian banks are facing in terms of Anti Money Laundering system and to delineate IT Portfolio Management to propose solutions for Indonesian banks, Indonesian Financial Transaction Reports and Analysis Centre (INTRAC) or any other related parties in to increase preventative measures for the financial sector, and, in doing so, to make money laundering through banking system more difficult to accomplish.

We will explore the current situation and key issues of Anti-Money Laundering scheme in Indonesia, in term of policy, strategy and system itself. Then, using IT Portfolio Management, which is combination of IT Policy Planning Strategy and IT Project Management (Ref. 1), we will derive a framework and master plan for implementing workable IT strategy and system implementation in the battle of Anti-Money Laundering in Indonesian banks.

Currently all banks have minimum system to monitor Money Laundering activities, or Suspicious Transactions. Even if they have, the process to compile the data and send the report to

Regulatory Bank takes several business working days. In this way, the money launderer would have been gone by the time the report reached Regulatory Bank.

To implement good monitoring or alert system, all banks should come up with a single system that monitors incoming and outgoing foreign transactions. The current SWIFT system should be well integrated with another monitoring or alert system, in a way that the moment a suspicious transaction takes place, the system will alert and inform the bank head office and, if possible, Regulatory Bank as well (Ref. 3).

A great deal must be done to fight money laundering in Indonesia, and, indeed, many efforts have already established for anti-money laundering basic steps, such as forming PPATK, drafting anti-money laundering laws, applying Know Your Customer (KYC) principle, and designing good design of IT system. The importance of IT system to support this effort plays a major role, and the starting point to do this is to design and plan a map or framework with IT project management for the system itself.

Keywords: money laundering, portfolio management, balance scorecard

Category: *Interdisciplinary Studies*

Presentation Media: Oral Presentation

Selected References

Books
[1] PMI (2008) *A Guide to the Project Management Body of Knowledge - Fourth Edition*, PMI

Journals
[2] SHARMAN, J.C. and CHAIKIN, D. (2009). "Corruption and AML Systems: Putting a Luxury Good to Work." *Governance Jan2009*, Vol. 22 Issue 1, p27-45, 19p
[3] UN, Money Laundering and the Financing of Terrorism: The United Nations Response, United Nations Office on Drugs and Crime, 1988

Internet Sources:
[4] FATF (2006). "NCCT Annual Report 2005-2006",
   http://www.fatf-gafi.org/dataoecd/0/0/37029619.pdf
[5] FATF Secretariat (2003). "Financial Action Task Force on Money Laundering," The Forty Recommendations, 2003 http://www.fatf-gafi.org/dataoecd/7/40/34849567.PDF

Community Involvement as a Driving Force in Restoration of Coastal Damages

Rahman Hidayat[1], Suranto[1], Sapto Nugroho[1], Theresia Niwung[2]

[1]Coastal Dynamics Research Center (BPDP-BPPT), Yogyakarta 55281, Indonesia

[2]Formerly at UPN "Veteran" Yogyakarta, Yogyakarta 55282, Indonesia

Email address: rahman_hidayat2002@yahoo.com

Abstract. *Hamadi beach is important economic and business center in the capital of Papua Province. A coastline of about 3.6 kilometers is dotted with offices, settlements, trade centers and traditional markets, fishing ports, fish landing and auction centers, hotels, and recreation areas. Nearly half of this coastline is a residential and recreational area owned and managed by residents. The beach is experiencing severe beach erosion which is also affecting public facilities such as road, and recreational facilities. Our initial survey confirmed that the coastal damage is caused by a combination of natural factors (for example a local uplift and subsidence caused by an earthquake) and human activities (like sand mining upstream resulting in decreased sand available at beach).*

This study investigates a case from Hamadi beach-Jayapura, Papua Province, Indonesia where local people were not favoring on government led coastal risk reduction and restoration measures. Combination of effective community consultation supplemented with modern audio-visual aid, not only raised awareness but also enhanced reliance of locals on the proposed project. Provincial government prepared a technical plan for coastal protection and beach safety design and proposed three alternative models for coastal protection through: submerged breakwater, revetment or seawall which is also expected to enhance the coastal environment of dense settlements and slums areas and thus overall quality of life, improve livelihood options etc. However, Hamadi beach is controlled by local people, and the government finds it difficult even to intervene in the matters of public interest include the proposed techno-fix to prevent coastal erosion.

Most of the property in Papua belongs to a particular clan or tribe and its use and management is highly dependent on the policies or the leadership of these tribes. This practice often paralyzes development interventions, if led solely by the government. At the same time, majority of the local settlements also seek immediate action to prevent the coastal damage and beach erosion. Recognizing this as root cause of the problem, this field-based study organized round of confidence building meetings with local tribal leaders and conducted surveys to engage perceptions and concerns of the local stakeholders. Integrated methodology of questionnaire survey, interviews, and direct communication helped. Use of easy to understand video-animation which provides overview of the technical plan and shows benefits of the proposed interventions resulted in confidence building. Consequently, the efforts led to support of 90% of the stakeholders for the immediate action to restore the coastal damage due to the erosion and 85% people supporting the integration of coastal damage prevention plan using both soft and hard engineering solution. The local community is also ensured its involved right from planning to implementation stage by the government. The local community is also ensured its involved right from planning to implementation stage by the government. Efforts are also being made to select those appropriate technology/engineering solutions that fit well with the local knowledge.

Keywords: Hamadi beach, Coastal damage, Community involvement, Local knowledge

Category: *Interdisciplinary Studies*

Presentation Media: Oral Presentation

References

[1] Herath, S., and Hidayat, R., (2010). *"Enhancing coastal resilience in Asia against climate change: Challenges and measures"*, Proceeding of International Symposium on Coastal Zones and Climate Change: Assessing the Impacts and Developing Adaptation Strategies, 12 – 13 April 2010, Monash University, Australia.

[2] Hidayat, R., Surjan, A., Niwung, T., Prasetya, G., Herath, S., Meguro, K., (2010). *"Role of community and local leaders in the successful restoration of coastal damage from natural and human-made disaster"*, Geophysical Research Abstracts Vol. 12, EGU2010-0, 2010 EGU General Assembly 2010.

[3] -----------,(2007). The report of "*Technical planning for the restoration of Hamadi beach-Jayapura,*" Public Works Office of Papua Province-PT.Dantama Rekanusa (*in Bahasa Indonesia*)

<u>LIST OF PRESENTERS</u>
DAFTAR NAMA PENYAJI

A
Achmad Basuki

Agus Rusdiana

Agustina Tri Endharti

Akhmad Sabarudin

Akhmad Syaiful Hidayat

Ali Khumaeni

Ambiyah

Amzul Rifin

Anang Sedyohutomo

Angga Pradesha

Anna Yuliarti Khodijah

Aprilia Beta Suandi

Aunuddin Syabba Vioktalamo

Azizul Khakim

Azridjal Aziz

B
Bambang Pramono

Bayu Indrawan

Bayu Prabowo

D
Deby Mardiansah

Denny Helard

Dessi Puji Lestari

Dewi Kusrini

Doni Hikmat Ramdhan

Donny Hendrawan

Dyah Wulandani

E
Eka Oktariyanto Nugroho

F
Endra Gunawan

Fabiola Baby Saroinsong

Fachrul Razi

Farah Alfanur

Farid Triawan

Fatwa Ramdani

Ferry Astika Saputra

H

Hani Rahmat Budi Norkusuma

Hari Hendarto

Hariyanti

I

Iqra Anugrah

Irene Santi Br. Bukit

Irwan Ridwan Rahim

K

Kusumandari

L

Lasmin

Lenny Saulia

Lisman Suryanegara

Litou Hendry

Lusi Oka Wardhani

M

M. Faisal Artjan

Maharani Hapsari

Malul Azam

Matlal Fajri Alif

Miftakhul Huda

Miga Magenika Julian

Morina Adfa

Muhammad Kunta Biddinika

Munadi

Murni Ramli

Mustamin Rahim

N

Nanung Agus Fitriyanto

Nidya Kartikasari

Novita Kurniawati

Nuraini Rahma Hanifa

O

Oce Madril

P

Pandji Prawisudha

Paramashanti

R

Rahman Hidayat
Rani Agustina Wulandari
Ratih Fitria Putri
Recky H E Sendouw
Rezza Muhammad
Rida SN Mahmudah
Rinto Anugraha Nur Qomaru Zaman
Risky Ayu Kristanti
Risvan Dirza
Rizqi Putri Nourma Budiarti
Roni
Rosady Mulyadi
Ryka Claudia Lolita

S

Santi Novani
Sara Wardhani
Shinta Indah
Siswoyo
Slamet Raharjo
Sri Hartuti
Sri Yayu Indriyani Rochandi
Sri Hastuty
Subejo
Sulistiyati Bayu Utami
Sunu Hadi Prabowo

T

T.M. Luthfi Yazid
Teddy Ardiansyah
Teguh Dartanto
Tri Harsono

U

Udin Bahrudin

V

Vita Paramita

Y

Yogi Rahmayanti
Yul Martin
Yulia Eka Putri