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RESEARCH NEWS OF UNIVERSITI PUTRA MALAYSIA **ISSUE 25 2ND QUARTER JUNE 2009**

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Photographs courtesy of Ahmad Fua'ad Alwi

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Scientists must be made aware of how important the impact of their work is and its possible applications on the society and public opinion. It is hoped that this digest will provide the opportunity to interact particularly through feedback or direct mail to the scientist from either the private sector or by scientists from other government research institutions.

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Editorial

Ethical Publications vs KPI...

It has been several years since UPM was recognised by the Malaysian government as one of the research universities. Since then, UPM has transformed in many ways, mainly to enhance and maintain the status and the status of a research university. Research outputs, as one of the most important criteria for a research university, have been streamlined where key performance indicators are being implemented for academic staffs with scientific publication as one of the major features. Each academic must fulfill the KPI, otherwise...

To encourage scientific publications, many incentives have been offered by UPM. Those wishing to publish in citation index or impact-factored journals but are required to pay for page fee, UPM has set aside funding to help researchers pay and publish. In fact, those that require quiet, undisturbed time with mentors in order to write scientific publication are encouraged for a retreat just to write in a relaxed environment, while the bills are being settled by UPM. Furthermore, those that published more than the requirement of the KPI each year are rewarded in cash. All these are in the name of encouraging UPM researchers to publish quality publications. And published they did...

Needless to say, the KPI has put great pressure while cash incentives provide opportunities for academics. There were evidences that few academics or even faculties, while trying to ease the KPI pressure, aiming for the cash incentive or taking opportunities on the publication funding, are trying to cut corners. Some started to publish in paid, citation-indexed but newly established international journals where paper acceptance is much easier due to less strenuous or no clear peer-review procedure practiced by the journals. Others make deals with editors of journals to publish the works of a group of UPM researchers. Worse, attempts have been made by few to start their own journals! The University Publication Committee has taken note that 62% of the publications in 2008 that UPM has helped to pay for page fee were published in newly established international journals that started publishing between 1 to 5 years ago. The same committee and the University Management Committee had expressed their concerns on the publication of these unauthorised journals by many local universities.

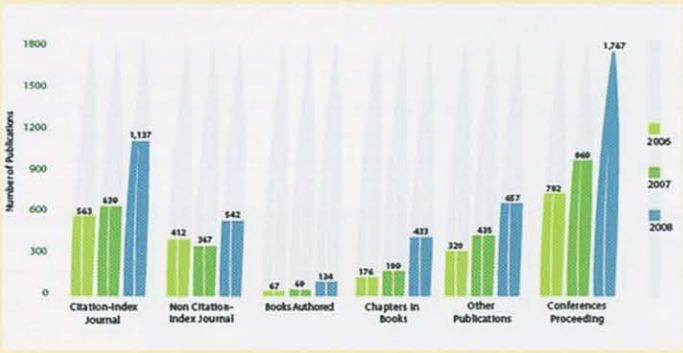
These practices are not illegal, but of ethical concern. Whilst most scientific publications by UPM researchers are of excellent quality in flagship and non-flagship journals, the emergence of few, less ethical publications are of concern. And this seemed to be growing by the days. Therefore, it is not surprising that issues on quality publication and publication ethics have started to emerge and discussed. In fact, the Research Management Centre has already received several complaints.

The management of Universiti Putra Malaysia has been trying to encourage scientific publication but at the same time trying to avoid low quality publications. To me, encouraging scientific publication is the responsibility of the university management while the quality and ethics of scientific publication are the responsibility of the researchers. Both sides are encouraged to fulfill their responsibilities while at the same time monitor the performance of each other. Only then the culture of quality scientific publication will eventually emerge. But then again, a culture requires a long time to establish...to grow...to be a way of life. However, slowly but surely, it will...

Mohd. Zamri Saad zamri@vet.upm.edu.my

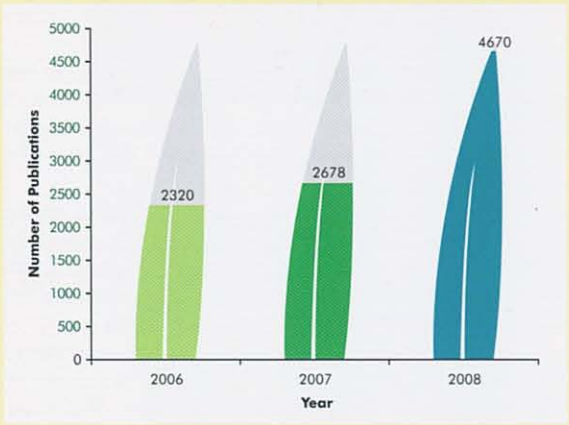
Facts & Figures

Publication



Graph 1: UPM R&D Publication (2006 – 2008)

In 2008, UPM had succeeded in publishing **4670** articles. From that number, 1137 (24%) were published in citation index journals, 542 (12%) in non-citation-index journals, 134 (3%) in book publications, 433 (9%) through chapters in books, 176 (3%) in conference proceedings, and 657 (14%) in other publications.



Graph 2: Number of Publications for the Year 2006 - 2008

Composite – Its Endless Journey

A composite, in its general term, is a solid material that results when two or more different substances, each with its own characteristics and properties, are combined to create a new substance whose properties are superior to those of the original components in a specific application. Composites are of greatest use in the aerospace industry in which their stiffness, lightness, and heat resistance make them the materials of choice in reinforcing the engine cowls, wings, doors, and flaps of aircraft. Composite materials are also used in rackets and other sports equipment, in cutting tools, and in certain parts of automotive engines.

Considering the potential of natural fibre composites, extensive research has been conducted on selected areas in natural fibre composites. Composite materials from agricultural by-products could be the key answer to turn the agriculture industry into an industry which is not only profitable but also environmental friendly. In tropical countries like Malaysia, fibrous plants are available in abundance, at low or no cost at all. Fibres like kenaf, sugar palm, oil palm, banana stem, coconut shell, wood, bamboo, ramie, abaca, coir, and pineapple leaf have been studied with polymers like epoxy, polyester, polyurethane, polystyrene and vinyl ester and PVC to form composites. Mechanical properties such as tensile, flexural and impact properties were the major parameters studied. Other properties such as thermal, environmental and physical properties were also investigated. Special attention has been focused on interfacial bonding between fibre and matrix in composites as it is a major problem in the use of natural fibre composites. Various treatment agents have been employed to address the issue such as alkali treatment and compatibiliser. Other important parameters studied were the selection of fibre length and fibre orientation. The results of mechanical properties of continuous fibre composites were normally desirable compared to short fibre or filled composites. Similarly woven fibre composites normally resulted in superior mechanical properties compared to random chopped fibre composites.

There has also been a rapid growth in the study and use of polymeric composite materials. The main focus has been on the development and study of high performance reinforcing materials like glass, carbon and aramid fibres in appropriate polymer matrices. Weight reduction, part consolidation, corrosion resistance and energy absorption capability are among the attributes of composite materials that made them materials of choice for automotive components.

Thus, a research on design and manufacture of polymer-based composite automotive pedal box system was carried out. The processing method employed was injection moulding and the material selected was short glass fibre reinforced polyamide composites. The work was extended to the development of polymer composite automotive driveshaft from hybrid aluminium/carbon and aluminium/glass fibre reinforced epoxy composites fabricated using the filament winding process. The low cost filament winding machine was developed in-house. The same filament winding machine is used to fabricate composite hollow tubes being used in the piping industry.

In addition, a conceptual design study of automotive components was carried out for the pedal box and automotive bumper system. Conceptual design is an important activity in total design model. In this approach, the design process is carried out using the following routes: market investigation, product design specification, conceptual design, detail design and manufacture.

During the conceptual design state, procedure and software-based engineering design methods can be employed. For software-based engineering design methods, the use of computer-aided design (CAD) is inevitable. Apart from the pedal box and bumper system, the CAD system is used extensively in the conceptual design of polymer composite automotive car racing body. It is an extension of the work on the development of automotive car race for student-based competition being held at national levels. Various procedure-based engineering design methods are used to come up with the best design concept in the development of selected composite components such as pedal box system (clutch, brake and accelerator pedal and mounting bracket), and bumper system (bumper fascia and bumper beam). Such methods include gallery method, systematic exploitation of proven ideas or of experience, extending the search space and morphological chart. Total design model, emphasising on the importance of conceptual design, is also employed in the development of furniture products and household appliances such as the telephone stand, multi-purpose table, book shelf and chair. The materials used in such studies are natural fibre composites.

Conceptual design is also one of the important elements in the study of design for manufacture or concurrent engineering. Concurrent engineering entails simultaneous consideration of life cycle activities involving personnel such as sales, designer, material engineer and manufacturing engineer. Concurrent engineering was adopted mainly for the enhancement of quality, reduced time to market and cost. Apart from conceptual design, other elements of concurrent engineering include materials selection, design analysis, manufacturing process selection and design to cost. In materials selection, several prototype computer aided materials selection systems have been developed to enable designers to select the most suitable materials for engineering components from composites. The selections of suitable materials for engineering components were taking into consideration mechanical, physical and chemical properties together with economic and manufacturing issues. Expert system, analytical hierarchy process and neural network were software systems used as platforms for the study of materials selection of selected engineering components such as bumper system, pedal box system and engine components made from composite materials. As far as design analysis is concerned, analysis of composite hovercraft hull base was also carried out in detail using finite element analysis software. Design analysis of composite pedal box system was also performed using finite element analysis and a mould flow analysis software was used extensively in studying the behaviour of material flow in mould for injection moulding of a clutch pedal.

Research in composites still has a long way to go...from the gigantic industry in aerospace to common household appliances. In the journey to fully discover their full potentials, many have benefited along the way...thanks to the continuous effort and dedication of our researchers.

Expert's Snapshots

Mohd. Sapuan Salit is the head of Department of Mechanical and Manufacturing Engineering, Universiti Putra Malaysia. He is the Vice President and Honorary Member of Asian Polymer Association; Fellow of Institute of Materials, Malaysia; Member, Society of Automotive Engineers; Member, Plastics and Rubber Institute, Malaysia and a Professional Engineer. He has published over 220 papers in referred journals, conferences/seminars and books in engineering. Professor Sapuan's research interests include composites and concurrent engineering. He sits in Editorial Boards for 18 journals and has reviewed over 140 papers to be refereed. He is the recipient of *Anugerah Karyawan Putra Cemerlang*, Excellence Award from Science Publication, New York, UPM Excellence Researcher Award, UPM Vice Chancellor Fellowship Prize and ISESCO Science Prize.

1. S. M. Sapuan and I. M. Mujtaba, 2009. Chapter 12, Development of a Prototype Computational Framework for Selection of Natural Fibre Reinforced Polymer Composite Materials using Neural Network, in S. M. Sapuan and I. M. Mujtaba (eds.), Composite Materials Technology: Neural Network Applications, CRC Press (an inprint of Taylor & Francis Group LLC), Boca Raton, Florida, USA, 317-339.

2. S. M. Sapuan, M. R. Osman and Y. Nukman, 2006. State of The-art of the Concurrent Engineering Technique in Automotive Industry. Journal of Engineering Design, Taylor & Francis, USA, 17, 2, 143-157.

3. S. M. Sapuan, 2005. Concurrent Design and Manufacturing Process of Automotive Composite Components. Assembly Automation, Emerald, Bradford, UK, 25, 2, 146–152.

4. S. M. Sapuan and M. A. Maleque, 2005. Design and Fabrication of Natural Woven Fabric Reinforced Epoxy Composite for Household Telephone Stand. Materials and Design, Elsevier Science, Netherlands, 26, 1, 65-71.

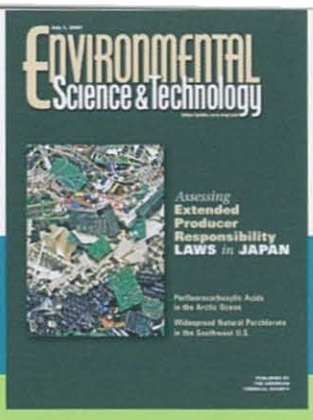
5. S. M. Sapuan, 2001. A Knowledge-based System for Material Selection in Mechanical Engineering Design. Materials and Design, Elsevier Science, Netherlands, 10, 8, 687-695.

- **BRONZE** *UPM Invention, Research & Innovation Exhibition (PRPI 2009)*
- **SILVER** *UPM Invention, Research & Innovation Exhibition (PRPI 2009)*
- ***Publication Incentive Award*** *- Excellence Researcher Award UPM 2008*
- ***Special International Award*** *- Excellence Researcher Award UPM 2008*
- ***Award*** *of ISESCO Science Prize in Technology 2008*
- ***Excellence in Research*** *- Vice Chancellor Fellowship Prize 2008*
- ***Publication Incentive Award*** *- Excellence Researcher Award UPM 2007*
- **BRONZE** *UPM Invention, Research & Innovation Exhibition (PRPI 2006)*
- **SILVER** *Malaysia Technology Expo (MTE 2006)*
- ***The Best Publication Award*** *- Excellence Researcher Award UPM 2005*
- ***Excellence Award*** *- Science Publications, New York, USA, December 2005*
- **SILVER** *UPM Invention, Research & Innovation Exhibition (PRPI 2005)*
- **BRONZE** *(3 awards) UPM Invention, Research & Innovation Exhibition (PRPI 2005)*

IF: 4.054

PBDEs

– An Environmental Pollutant of Increasing Concern



Title : Asian Mussel Watch Programme: Contamination Status of Polybrominated Diphenyl Ethers and Organochlorine in Coastal Waters of Asian Countries
Author : Ramu K., Kajiwara N., Sudaryanto A., Isobe T., Takahashi S., Subramaniam A., Ueno D., Zheng G.I., Lam P.K.S.,Takada H., Zakaria M.P., Prudente M., Tana T.S., Tanabe S.
Journal : Environmental Science and Technology
Volume : 41
Issue : 13
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Impact Factor: 4.054

Coupled with economic development, an escalation in agricultural and industrial activities in Asia has resulted in the increased in production and usage of various chemicals in this region. Among the organic contaminants of current interest and concern, recent evidence has confirmed that the brominated flame retardants (BFRs), like polybrominated diphenyl ethers (PBDEs), are ubiquitous environmental pollutants and are similar in physicochemical properties to a number of other persistent organic pollutants (POPs). PBDEs have been commonly used in furniture (polyurethane foam), wire and cable insulation, electronics and computers (high impact polystyrene), etc. Over the past decade, several environmental monitoring programmes have indicated increasing levels of several tetra- to deca-BDE isomers in sediments, bird eggs, marine mammals, and human tissues. Increasing concentrations of PBDEs in the environment have been attributed to several causes, including increased disposal of outdated electronic equipment (2) and volatile losses from products in use. Due to the widespread use of these compounds as flame retardants, there is a growing concern on monitoring the levels of PBDEs in different environmental compartments in order to determine their environmental impact. Studies on environmental behaviour of PBDEs are chiefly derived from Europe and North America and there are only a few reports from Asia. As a result, there is an urgent need to identify sources of PBDEs in the Asian region.

Mussel samples were used in this study to measure the levels of polybrominated diphenyl ethers (PBDEs) and organochlorines (OCs) in the coastal waters of Asian countries like Cambodia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, the Philippines, and Vietnam. PBDEs were detected in all the samples analysed, and the concentrations ranged from 0.66 to 440 ng/g lipid wt. Apparently higher concentrations of PBDEs were found in mussels from the coastal waters of Korea, Hong Kong, China, and the Philippines, which suggests that significant sources of these chemicals exist in and around this region. With regard to the composition of PBDE congeners, BDE-47, BDE-99, and BDE-100 were the dominant congeners in most of the samples. Among the OCs analysed, concentrations of DDTs were the highest followed by PCBs > CHLs > HCHs > HCB. Total concentrations of DDTs, PCBs, CHLs, and HCHs in mussel samples ranged from 21 to 58 000, 3.8 to 2000, 0.93 to 900, and 0.90 to 230 ng/g lipid wt., respectively. High levels of DDTs were found in mussels from Hong Kong, Vietnam, and China; PCBs were found in Japan, Hong Kong, and industrialised/urbanised locations in Korea, Indonesia, the Philippines, and India; CHLs were found in Japan and Hong Kong; HCHs were found in India and China. These countries seem to play a role as probable emission sources of corresponding contaminants in Asia and, in turn, may influence their global distribution.

1. E. L. Teuten, J. M. Saquing, D. R. U. Knappe, M. A. Barlaz, S. Jonsson, A. Björn, S. J. Rowland, R. C. Thompson, T. S. Galloway, R. Yamashita, D. Ochi, Y. Watanuki, C. Moore, P. H. Viet, T. S. Tana, M. Prudente, R. Boonyatumanond, M. P. Zakaria, K. Akkhavong, Y. Ogata, H. Hirai, S. Iwasa, K. Mizukawa, Y. Hagino, A. Imamura, M. Saha and H. Takada, 2009. Transport and Release of Chemicals from Plastics to The Environment and to Wildlife. Philosophical Transactions of the Royal Society B: Biological Sciences, 364, 1526, 2027-2045.

2. Y. Ogata, H. Takada, K. Mizukawa, H. Hirai, S. Iwasa, S. Endo, Y. Mato, M. Saha, K. Okuda, A. Nakashima, M. Murakami, N. Zurcher, R. Booyatumanondo, M. P. Zakaria, L. Q. Dung, M. Gordon, C. Miguez, S. Suzuki, C. Moore, H. K. Karapanagioti, S. Weerts, T. McClurg, E. Burres, W. Smith, M. V. Velkenburg, J. S. Lang, R. C. Lang, D. Laursen, B. Danner, N. Stewardson and R. C. Thompson. International Pellet Watch: Global Monitoring of Persistent Organic Pollutants (POPs) in Coastal Waters. 1. Initial phase data on PCBs, DDTs, and HCHs. Marine Pollution Bulletin. (In Press).

3. S. Tsutsumi, Y. Yamaguchi, I. Nishida, K. –I. Akiyama, M. P. Zakaria and H. Takada, 2002. Alkylbenzenes in Mussels from South and South East Asian Coasts as a Molecular Tool to Assess Sewage Impact. Marine Pollution Bulletin, 45, 1-12, 325-331.

4. T. Isobe, H. Takada, M. Kanai, S. Tsutsumi, K. O. Isobe, R. Boonyatumanond and M. P. Zakaria, 2007. Distribution of Polycyclic Aromatic Hydrocarbons (PAHs) and Phenolic Endocrine Disrupting Chemicals in South and Southeast Asian Mussels. Environmental Monitoring and Assessment, 135, 1-3, 423-440.

5. M. P. Zakaria, A. Horinouchi, S. Tsutsumi, H. Takada, S. Tanabe and A. Ismail, 2000. Oil Pollution in The Straits of Malacca, Malaysia: Application of Molecular Markers for Source Identification. Environmental Science and Technology, 34, 7, 1189-1196.

- SILVER UPM Invention, Research & Innovation Exhibition (PRPI 2009)
- BRONZE UPM Invention, Research & Innovation Exhibition (PRPI 2009)
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- GOLD UPM Invention, Research & Innovation Exhibition (PRPI 2007)
- SILVER UPM Invention, Research & Innovation Exhibition (PRPI 2007)
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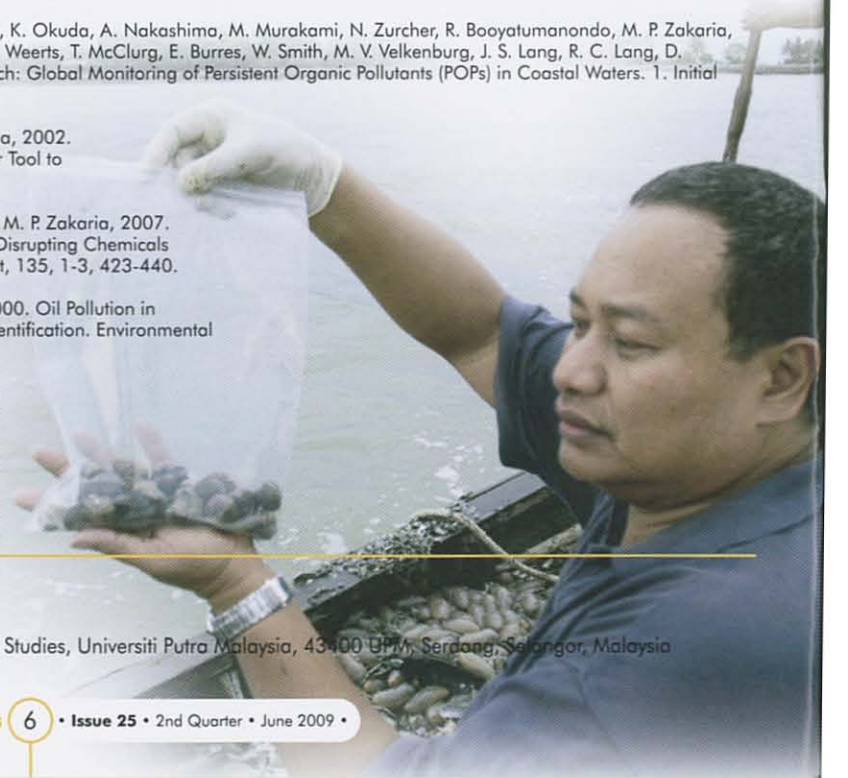

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SOAP
Smart Home Systems

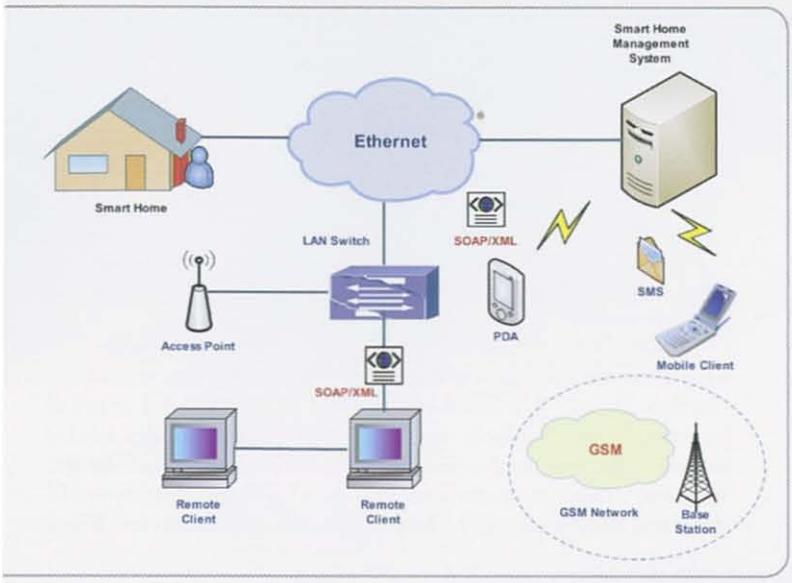

Figure 1: SOAP Implementation in Residential Management for Smart Home Systems

Smart home systems, the next gigantic leap in the field of remote monitoring, has become an important emerging research field in recent times. In the past decade, research on smart homes has been gradually moving towards application of ubiquitous computing, tackling issues on device heterogeneity and interoperability. A smart home adjusts its function to the inhabitant's need according to the information it collects from inhabitants, the computation system and the context. Smart home systems and appliances increasingly contribute towards data-intensive environment, resulting in few problems of management and operation issues. The first obstacle is due to existence of heterogeneous devices in smart home systems, number of gateways grows up drastically with regard of protocols, standards and networks to be connected. The second problem is the differences in hardware, operating systems, programming language and resources accepted by smart home systems operation especially in home appliances control. The key factor is to solve the interface between external information networks and the smart home using a common gateway control which could cater for all type of home appliances. One potential solution is through Web Services technology which can provide vendor among applications, services and devices. Web Services revolutionized how software interacts regardless how the applications were built or the platform on which they run as well as reducing lifetime cost for home dwellers. The use of Web Services technology provides a degree of flexibility and dynamic scalability of managing and adding home appliances of different genre in smart home systems for daily interoperation. In Web Services, instructions are based on the Simple Object Access Protocol or widely known as SOAP technology. SOAP technology is based on Extensible Markup Language (XML) that provides standard network communications between software entities. It functions as

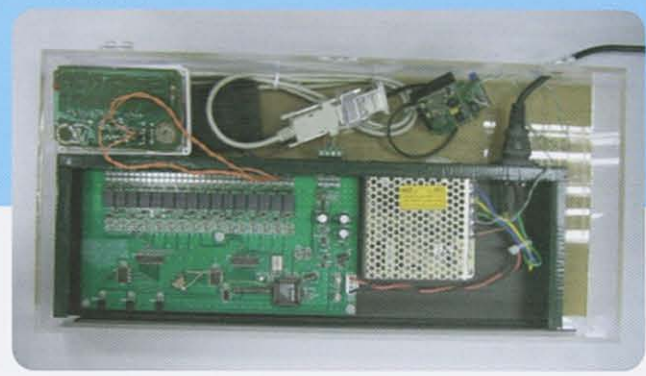

Figure 2: 15 Channel Triggering Unit

general-purpose protocol for sending messages from one application to another. Using SOAP technology, Web Services can be invoked by turning a service invocation into XML message format, exchange the message and finally turn the XML message format into actual service invocation. SOAP technology enables cross-platform and interoperability support for heterogeneous systems as well as legacy systems supports in home environment by reducing the cost of new system deployment. A residential management system prototype using SOAP and Web Services as message exchange mechanism developed to solve the interoperation of heterogeneous appliances in smart home systems. The prototype was developed consisting of 15 feedback channels defined with SOAP messages for heterogeneous systems operation. If the residential management system experiences server downtime, it can still be controlled using alternate control mechanism with GSM network via SMS Module locally and remotely. This system offers a complete, bi-directional control and monitoring of smart home systems in an interoperable fashion. This technology can be integrated with other home services or safety-critical sub-systems that are compliant with Ethernet infrastructure such fire alarm system, CCTV system, intrusion system and building management to provide joint execution of tasks and interoperability using Web Services.

1. T. Perumal, A. R. Ramli and C. Y. Leong, 2008. Design and Implementation of SOAP-based Residential Management for Smart Home Systems. Consumer Electronics, IEEE Transactions on, 54, 453-459.

2. T. Perumal, A. R. Ramli, C. Y. Leong, S. Mansor and K. Samsudin, 2008. Interoperability for Smart Home Environment using Web Services. International Journal of Smart Home, 2, 4, 1-16.

3. T. Perumal, A. R. Ramli and C. Y. Leong, 2008. SOAP-based Residential Management. IEEE International Workshop of Digital Infotainment and Visualisation (IWDTV), Universiti Malaysia Terengganu-NTU Singapore.

4. T. Perumal, A. R. Ramli, C. Y. Leong, S. Mansor and K. Samsudin, 2008. Interoperability among Heterogeneous Systems in Smart Home. IEEE International Conference on Signal Image Technology and Internet Based Systems (SITIS 2008).

5. T. Perumal, A. R. Ramli, C. Y. Leong, S. Mansor and K. Samsudin, 2008. Interoperable Smart Home Systems using Web Services. International Conference on Science and Technology (ISCTIE2008), Universiti Teknologi MARA.

- **GOLD** *UPM Invention, Research & Innovation Exhibition (PRPI 2008)*
- **BRONZE** *Malaysian Technology Expo (MTE 2008)*

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Kuih Bijan
– A Traditional Delicacy in the Modern World

Kuih Bijan (sesame crackers) is a popular Malay traditional food made of glutinous rice flour, sugar, eggs and water. In the traditional production of *Kuih Bijan*, there are several stages involved: dough preparation, dough shaping, coating the dough with sesame and finally, frying the dough. The most difficult part is at the second stage, which is to form the dough into small round shape. This is because the dough is quite sticky and thus making the process even more complicated. Hence, a *Kuih Bijan* machine was designed and developed in order to solve this problem.

A *Kuih Bijan* machine, which is intended for the small scale industry, was designed as a continuous process and is divided into three main functions: extrusion of the dough; cutting the dough; shaping and coating the dough with sesame seeds. The operational process is simple. The *kuih bijan* dough will be fed into the extrusion section, and then the dough is shaped through a die. The stainless steel cutter will then cut the dough and the *Kuih Bijan* ball will be collected and coated with sesame in the rotating drum. This machine is able to reduce the manual handling time, hygienic and consistent in producing quality product. Sensory evaluation on the *Kuih Bijan* produced by this machine shows that there is no significant difference in term of its taste and texture compared to the manually-produced *Kuih Bijan*.

Figure 1: Traditional Method for Making *Kuih Bijan*

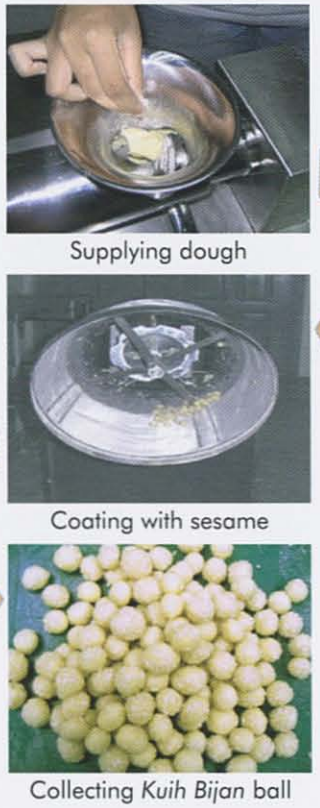

Figure 2: The Simple Process using the *Kuih Bijan* Machine

- ***IPR No.*** *PI 20070388*
- ***BRONZE*** *International Invention, Innovation & Technology Exhibition (ITEX 2007)*
- ***SILVER*** *UPM Invention, Research & Innovation Exhibition (PRPI 2006)*

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Mobile IPv6 – The Latest Network

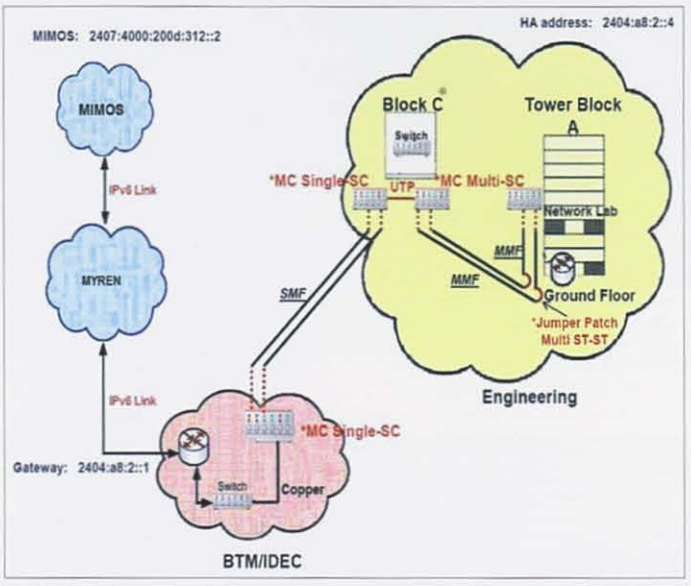

Figure 1: Layout of IPv6 Network Connection to MIMOS

This invention is related to a mobile network with enhanced router that offers a better and secured on-line experience in interactive programs, video streaming and data communications.

The Internet is a worldwide, publicly accessible system of interconnected computer networks that transmit data by packet switching using standard Internet Protocol (IP). The Internet has brought along with a new way of doing business and in leisure.

Today mobile population requires equally mobile, dependable and reliable ICT system that allows them to access information on the move, multicast, and many other requirements. With such a demand, the Internet has to evolve to cater for the various needs of the population. IPv6 has been introduced to overcome the shortcomings of traditional IP (IPv4) and to exchange data across a packet-switched internetwork.

IPv6 is intended to provide more addresses for network devices with some features as larger address space (128 bits), signalling security (IPsec), seamless mobility support, stateless auto-configuration of hosts and multicast. Mobile IPv6 allows roaming of users seamlessly from one network to another.

Mobile IPv6 (MIPv6) mechanism requires some handover algorithm when it changes its point of attachment in the Internet. This causes MIPv6 to incur long delays and high signaling load to the backbone networks and the attendant packet loss. This limitation is due to the lack of hierarchy and fast handover in the MIPv6 mobility management and because it uses the same mechanism for both macro and micro mobility.

One major component in MIPv6 that is needed to be considered is the security for most messages. The Internet Engineering Task Force (IETF) has developed the IPsec protocol to protect the signalling only due to its high processing power requirement. Hence, there is a serious challenge to secure MIPv6 data as there is no data protection method when MN moves from one network to another, in RFC 3775.

The present invention provides a method to improve the data-security and handover delay in Mobile IPv6 so as to offer uninterrupted on-line experience in network applications such as in entertainment, games, video conferencing or video streaming while on the move. Besides that, it also provides secured communication in the network in terms of data integrity.

An enhanced micro mobility handover algorithm is developed on top of mobile IPv6. This method solves the problem of long delay and packet loss incurred during handover through enhancement of handover management in Mobile IPv6. Then an enhanced security algorithm for Mobile IPv6 has been developed and implemented to overcome the problems that occur by Man-In-The-Middle (MITM) attacks (or any foreign attacks) against route optimization. This algorithm is able to detect and prevent all attacks from modifying the data that can significantly improve the data security.

Some of the major applications would be in Wireless IP types of networks such as WiMax. The use of the technology of the present invention is always expected to guarantee secured communication in network. Also during handover there will be no packet loss with 94.32% and 84.43% reduced handover and packet delays respectively.

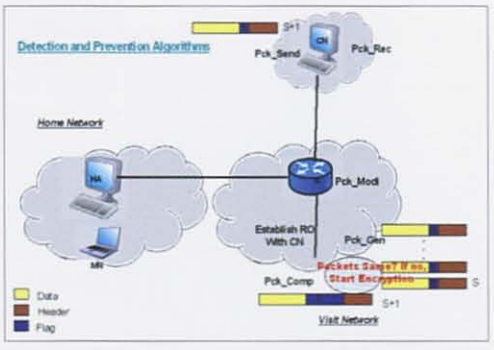

Figure 2: Detection and Prevention Algorithms

1. S. A. Al-Talib, B. M. Ali, S. Khatun and S. Subramaniam, 2007. Improving the Multicast State Scalability in Internet Routers by Integrating Hash Algorithm with Recursive Unicast. Journal of Network and Computer Applications, Elsevier Science, UK, 30, 1445-1454.
2. Y. C. Eu, S. Khatun, B. M. Ali and M. Othman, 2008. Multicast, Hierarchical and Fast Handover In Mobile Ipv6 Wireless Network - A Test-bed Experience. International Journal of Computers and Applications, ACTA Press/IASTED, 30, 3, 207-212.
3. A. Mehdizadeh, S. Khatun, B. M. Ali, R. S. A. R. Abdullah and G. Kurup, 2008. Security Enhancement of Route Optimisation in Mobile IPv6 Wireless Networks: A Test-bed Experience. Communications in Computer and Information Science Series, Advances in Computer Science and Engineering, Springer Berlin Heidelberg, 6, 153-159.
4. A. Mehdizadeh, S. Khatun, B. M. Ali, R. S. A. R. Abdullah and G. Kurup, 2008. Security Enhancement of Route Optimisation in Mobile IPv6 Networks. International Reviews on Computers and Software (IRECOS), Praise Worthy Prize, 3, 1, 1-10.
5. S. Al-Talib, B. M. Ali and S. Khatun, 2006. Integrating Multicasting and Hash Algorithm to Support Host Mobility. International Arab Journal of Information Technology (IAJIT), 3, 1, 55-61. (CI: EBSCO).

- ***Best of the Best Award*** - *Malaysian Technology Expo (MTE 2009)*
- **GOLD** *Malaysian Technology Expo (MTE 2009)*
- **GOLD** *UPM Invention, Research & Innovation Exhibition (PRPI 2008)*
- **BRONZE** *UPM Invention, Research & Innovation Exhibition (PRPI 2007)*
- ***Best Invention*** - *Asia-Pacific RIM 2006 Award, INPEX 2006*
- ***Special Award*** - *Korea Invention Promotion Association (KIPA), INPEX 2006*
- **GOLD** *(2 awards) Invention & New Product Exposition (INPEX 2006)*

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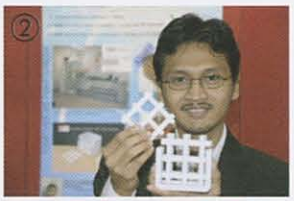
2009 UPM RESEARCH FINDINGS PROMOTION CEREMONY

Energy-saving Pasteuriser *(22 April 2009)*

1. **CONFIDENCE IN FRONT OF LENS:** Nurul Faezawaty (Research Officer) gives a brief explanation to the media.
2. **DEMONSTRATION IN PROGRESS:** Ir. Prof. Dr. Norman Mariun's team is about to demonstrate their *Energy-saving Pasteuriser*.
3. **FLOWER AMONG THE THORNS:** *(From left)* Dr. Hashim Hizam, Ir. Prof. Dr. Norman Mariun, Hishamuddin Jamaludin, Nurul Faezawaty and Arash Toudeshki.

Wire Mesh Collimator
(20 May 2009)

1. **TAKE NOTES!:** The media give their full attention to Dr. M. Iqbal Saripan's speech.
2. **TAKE A CLOSE LOOK:** Dr. Iqbal gives a preview of his invention.
3. **WINNER'S SMILE:** Dr. Iqbal with his collimator and awards received.



NATIONAL INTELLECTUAL PROPERTY DAY
(23 – 26 April 2009)

1. **WE HAVE WON!:** *(From left)* Prof. Dr. Mohd Basyaruddin Abdul Rahman, Prof. Dato' Dr. Mohamed Shariff Mohamed Din (the Director of ICC) and Prof. Dr. Yaakob Che Man.

2 & 3. **WINNERS:** Award receiving ceremony.

37TH INTERNATIONAL EXHIBITION OF INVENTIONS, NEW TECHNIQUES AND PRODUCTS (GENEVA)
(1 – 5 April 2009)

CONGRATULATIONS!: UPM's winners at Geneva, *(from left)* Prof. Dr. Jamilah Bakar, Assoc. Prof. Datin Dr. Siti Nor Akmar Abdullah and Assoc. Prof. Dr. Sa'ari Mustapha.

WORLD *HALAL* RESEARCH SUMMIT 2009
(7 – 8 May 2009)

1. **AN INTELLECTUAL WHISPER:** Datuk Seri Najib Tun Razak seems like whispering something to Prof. Dr. Yaakob Che Man while presenting the 'World *Halal* Research Summit Award'.
2. **CAPTURE THE MOMENT:** Prof. Dr. Yaakob Che Man *(centre)* and his team being photographed at the Kuala Lumpur Convention Centre (KLCC).

ResearchHAPPENINGS

INVENTION, INNOVATION AND TECHNOLOGY EXHIBITION (ITEX 2009)

(15 – 17 May 2009)

1. **TAKE A BOW:** Dr. Sieo Chin Chin receives the gold medal from the President of Malaysian Invention & Design Society, Prof. Emeritus Tan Sri Datuk Dr. Augustine S.H. Ong.
2. **EXHIBITOR & THE BOOTH:** One of UPM's booths at ITEX 2009.
3. **MITSOZYME:** Ruminants to Poultry – Beneficial Microbe and Gene from Dr. Sieo Chin Chin.
4. **AWARD RECIPIENTS:** UPM's winners at ITEX 2009.

TRIP TO KOTA MARUDU, SABAH

(20 – 31 May 2009)

1. **BRIEF FROM THE EXPERT:** Assoc. Prof. Dr. Awang Noor Abd. Ghani is sharing his expertise.
2. **CORPORATE FISHERMAN:** Our VC, Prof. Datuk Dr. Nik Mustapha *(third from left)* shows his secret talent.
3. **NOT A FISHING TRIP:** Water testing in progress.
4. **STILL NOT A FISHING TRIP:** A research procedure that looks like a fish catching activity.

WORKSHOP ON THE INTRODUCTION OF MEDICINAL PLANTS

(26 – 27 May 2009)

LISTEN CAREFULLY: Journalist being briefed on herb plants at the Agricultural Conservatory Park, Institute of Bioscience, UPM by our Science Officers, Julia Abdul Aziz and Tajuddin Abdul Manap.

INTERNATIONAL CONFERENCE ON EDUCATIONAL RESEARCH AND PRACTISE (ICERP)

(10 – 11 June 2009)

1. **ALL RISE!:** YB Dr. Hou Kok Chung (the Deputy Minister, Ministry of Higher Education) making his entrance at the Convention Hall, Putrajaya Marriot Hotel.
2. **WELCOME TO MALAYSIA:** Participants from all over the world join ICERP.

Understanding Microglia:
The Immune Cells of the Central Nervous System

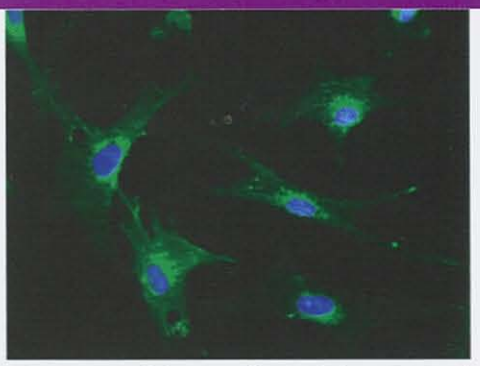


Figure 1: Adult Microglia in Culture Stained with FITC-tagged Lectin and DAPI

The cellular compartment of the central nervous system (CNS) consists of neurones and glia. Whilst neurones fire electrical impulses to transmit messages, glia were classically thought to be mere 'connective tissue' of the brain. This notion no longer holds true. Astrocytes, oligodendrocytes and microglia are now known to have specific functions within the complex CNS microenvironment.

Microglia are the resident macrophages of the CNS. They scavenge brain tissue, acting as sensors that monitor the wellbeing of the CNS milieu. When the brain is stressed or injured, microglia assume an activated phenotype to launch an inflammatory attack on the assailant. To do this, activated microglia proliferate, upregulate expression of inflammatory receptors, produce inflammatory mediators and become phagocytic.

As with all inflammatory responses, this attack is a double-edged sword. While short-term inflammation clears infection and leads to healing, prolonged inflammation can backfire and result in undesirable tissue and cell damage in the host. These consequences are particularly threatening for the CNS as neurones have a limited capacity for repair. It is this delicate balance between the physiological and pathological role of microglia that strikes our interest.

The role of microglia in neuroinflammation and approaches to control its responses are the crux of our work. We have developed microglia cell cultures from rats of age 3 days postnatal to 3 years to study the effects of aging on microglial responses. Various improvisations to the culture technique, including coating culture flasks with a polymer matrix and supplementing culture media with the mitogen macrophage colony-stimulating factor, were necessary to 'coax' adult cells into proliferation in culture.

In an attempt to control the inflammatory responses of microglia, we approach this research question in two ways: (1) coculturing microglia with mesenchymal stem cells (MSC) and (2) treating microglia with tocotrienols. The basis of the first approach is that MSC have been shown to suppress activities of other immune cells, including T and B cells. In our work, we show that mouse bone marrow-derived MSC inhibits proliferation of microglia before and after activation by 53.5% and 35.5% respectively ($p<.05$). Expression of CD4O, a crucial costimulator for the antigen - presenting capacity of microglia, also reduces in presence of MSC. Interestingly, we also report cross-talk between the two cell types, in that activated microglia encourage MSC to produce nitric oxide. The physiological significance of this remains to be determined. In the second approach, tocotrienols have long been shown to be anti-inflammatory and there is literature to demonstrate their protective properties in neurones. Similar data is lacking for microglia, and we are working together with Carotech Bhd using tocotrienols isolated from palm oil to determine whether tocotrienols can limit the inflammatory activities of microglia. Preliminary results indicate that the delta tocotrienol fragment reduces production of inflammatory mediators by microglia.

The neurone has long held the attention of neuroscientists. By seeking to understand microglial responses to stress, the therapeutic promise of limiting inflammatory reactions and tissue damage within the CNS is probable.

1. S. Vidyadaran, Y. Y. Ooi, H. Subramaiam, A. Badiei, M. Abdullah, R. Ramasamy and H. F. Seow, 2009. Effects of Macrophage Colony-stimulating Factor on Microglial Responses to Lipopolysaccharide and Beta Amyloid. Cellular Immunology, 259, 1, 105-10.

2. C. K. Tong, S. V. H. Pour, S. Vidyadaran, S. Y. Latifah, H. F. Seow and R. Rajesh, 2007. Human Bone Marrow-derived Mesenchymal Stem Cells Suppress T Cell Proliferation by Inducing Cell Cycle Arrest. Malaysian Journal of Medicine and Health Sciences, 4, 1, 41-50.

3. R. Ramasamy, F. Dazzi, C. K. Tong, S. Vidyadaran and H. F. Seow, 2008. The Immunosuppressive Effect of Human Bone Marrow-derived Mesenchymal Stem Cell Targets T Cell Proliferation but Not its Effector Functions. Cellular Immunology, 251, 2, 131-6.

4. Y. Y. Ooi, R. Ramasamy and S. Vidyadaran, 2008. Mouse Bone Marrow Mesenchymal Stem Cells Acquire CD45-CD106+ Immunophenotype only at Later Passages. Med. J. Malaysia. 63 Suppl A: 65-6.

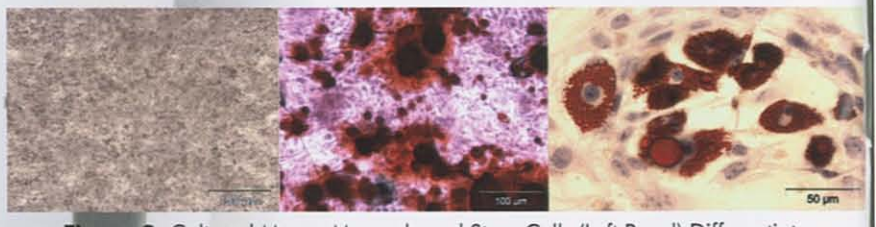


Figure 2: Cultured Mouse Mesenchymal Stem Cells (Left Panel) Differentiate into Osteocytes (Middle Panel) and Adipocytes (Right Panel)

- **SILVER** *UPM Invention, Research & Innovation Exhibition (PRPI 2009)*
- **Winner** *L'Oreal Malaysia For Women in Science Fellowship, 2008*
- **BRONZE** *Malaysian Technology Expo (MTE 2008)*
- **BRONZE** *UPM Invention, Research & Innovation Exhibition (PRPI 2007)*

Reader Enquiry:

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This is the fifth part of the continuing series of this feature article.
The fourth part was published in Synthesis Issue 24 (March 2009).

Guidelines for Pollution in Drinking Water

Mohammad Reza Mohammad Shafiee, Mohamad Pauzi Zakaria, Nayan Deep S. Kanwal, Mahyar Sakari, Pourya Shahpoury Bahry and Alireza Riyahi Bakhtiari

Water pollution is one of the major and serious health threats to the environment as well as human beings. There are several pollutants that are a threat to the drinking water and they can be classified in six categories, i.e.:

- microorganisms;
- disinfectants;
- disinfection byproducts;
- **inorganic chemicals**;
- organic chemicals; and
- radio nuclides.

These form the potential pollutants to human drinking water worldwide. The current guideline provides necessary information on these threats. The first three categories have been covered in the previous issue(s) of Synthesis. Information on the fourth category that focuses on Inorganic chemicals is provided in this issue.

Chromium

Chromium is a metal found in natural deposits as ores containing other elements. The greatest use of chromium is in metal alloys such as stainless steel; protective coatings on metal; magnetic tapes; and pigments for paints, cement, paper, rubber, composition floor covering and other materials. Its soluble forms are used in wood preservatives.

Short-term: US-EPA has found chromium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: skin irritation or ulceration.

Long-term: Chromium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: damage to liver, kidney circulatory and nerve tissues; skin irritation.

Though chromium occurs in nature mostly as chrome iron ore and is widely found in soils and plants, it is rare in natural waters. The two largest sources of chromium emission in the atmosphere are from the chemical manufacturing industry and combustion of natural gas, oil, and coal.

Copper

Copper is a metal found in natural deposits as ores containing other elements. It is widely used in household plumbing materials.

Short- and long-term effects: Copper is an essential nutrient, required by the body in very small amounts. However, US-EPA has found copper to potentially cause the following health effects when people are exposed to it at levels above the Action Level. Short periods of exposure can cause gastrointestinal disturbance, including nausea and vomiting. Use of water that exceeds the Action Level over many years could cause liver or kidney damage. People with Wilsons disease may be more sensitive than others to the effect of copper contamination and should consult their health care provider.

Copper may occur in drinking water either by contamination of the source water used by the water system, or by corrosion of copper plumbing. Corrosion of plumbing is by far the greatest cause for concern. Copper is rarely found in source water, but copper mining and smelting operations and municipal incineration may be sources of contamination.

Cyanide

Cyanide is a carbon-nitrogen chemical unit which combines with many organic and inorganic compounds. The most commonly used form, hydrogen cyanide, is mainly used to make the compounds needed to make nylon and other synthetic fibres and resins. Other cyanides are used as herbicides.

Short-term: US-EPA has found cyanide to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: rapid breathing, tremors and other neurological effects.

Long-term: Cyanide has the potential to cause the following effects from a lifetime exposure at levels above the MCL: weight loss, thyroid effects, nerve damage.

The major cyanide releases to water are discharges from metal finishing industries, iron and steel mills, and organic chemical industries. Releases to soil appear to be primarily from disposal of cyanide wastes in landfills and the use of cyanide-containing road salts. Chlorination treatment of some wastewaters can produce cyanides as a by-product.

Lead

Lead, a metal found in natural deposits, is commonly used in household plumbing materials and water service lines. The greatest exposure to lead is swallowing or breathing in lead paint chips and dust.

But lead in drinking water can also cause a variety of adverse health effects. In babies and children, exposure to lead in drinking water above the action level can result in delays in physical and mental development, along with slight deficits in attention span and learning abilities. In adults, it can cause increases in blood pressure. Adults who drink this water over many years could develop kidney problems or high blood pressure.

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures and solder. However, new homes are also at risk: even legally "lead-free" plumbing may contain up to 8 percent lead. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water.

Mercury

Mercury is a liquid metal found in natural deposits as ores containing other elements. Electrical products such as dry-cell batteries, fluorescent light bulbs, switches, and other control equipment account for 50% of mercury used.

Short- or Long-term: US-EPA has found mercury to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: kidney damage.

Mercury is unique among metals in that it can evaporate when released to water or soil. Also, microbes can convert inorganic forms of mercury to organic forms which can be accumulated by aquatic life.

Nitrates / Nitrites

Nitrates and nitrites are nitrogen-oxygen chemical units which combine with various organic and inorganic compounds. Once taken into the body, nitrates are converted into nitrites. The greatest use of nitrates is as a fertiliser.

Short-term: Excessive levels of nitrate in drinking water have caused serious illness and sometimes death. The serious illness in infants is due to the conversion of nitrate to nitrite by the body, which can interfere with the oxygen-carrying capacity of the child's blood. This can be an acute condition in which health deteriorates rapidly over a period of days. Symptoms include shortness of breath and blueness of the skin.

Long-term: Nitrates and nitrites have the potential to cause the following effects from a lifetime exposure at levels above the MCL: dieresis, increased starchy deposits and hemorrhaging of the spleen.

Selenium

Selenium is a metal found in natural deposits as ores containing other elements. The greatest use of selenium compounds is in electronic and photocopier components, but they are also widely used in glass, pigments, rubber, metal alloys, textiles, petroleum, medical therapeutic agents, and photographic emulsions.

Short-term: Selenium is an essential nutrient at low levels. However, US-EPA has found selenium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: hair and fingernail changes; damage to the peripheral nervous system; fatigue and irritability.

Long-term: Selenium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: hair and fingernail loss; damage to kidney and liver tissue, and the nervous and circulatory systems.

The toxicity of selenium depends on whether it is in the biologically active oxidised form, which occurs in alkaline soils. These conditions can cause plant uptake of the metal to be increased. It is known that selenium accumulates in living tissues.

Thallium

Thallium is a metal found in natural deposits as ores containing other elements. The greatest use of thallium is in specialised electronic research equipment.

Short-term: US-EPA has found thallium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: gastrointestinal irritation; nerve damage.

Long-term: Thallium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: changes in blood chemistry; damage to liver, kidney, intestinal and testicular tissues; hair loss.

Thallium does not long persist if released to water, but does have a strong tendency to accumulate in aquatic life. If released to land, it may bind to alkaline soils, but may otherwise migrate to ground water.

...to be continued in Synthesis Issue 26, September 2009

NewsBriefs

Ir. Prof. Dr. Norman Mariun and his 'Energy-saving Pasteuriser' team after the press conference.

Energy-saving Pasteuriser

An energy-saving pasteurising machine managed to win a gold medal at the International Trade Fair Ideas-Inventions-New Product Exhibition (IENA 2008) in Nuremberg, Germany.

The pasteurising heater machine, with the use of the ohmic heater, enables end-users to pasteurise food and save energy at the same time. This is definitely beneficial for the huge application in the food and beverage industry and has been cleverly invented by a group of Universiti Putra Malaysia (UPM) researchers.

The team research leader, Ir. Prof. Dr. Norman Mariun from the Faculty of Engineering, said that the machine is able to create its own heat energy and hasten the increase in temperature which can be transferred to the food.

"The pasteurised product will become very hot within 20-30 minutes compared to a conventional heater which uses excessive heat and electricity."

"This process is able to reduce production costs because industry members do no need to use costly steam boilers," he said further at the UPM's Research Findings Promotion event held at UPM recently.

He added that pasteurising will not only decrease microorganismic activities, which cause food to spoil, but also enable food to be kept longer at lower temperatures.

"The device is also more cost efficient since as much as 30 to 60 percent of capital cost could be saved. In addition, handling costs would be 50 – 75 percent lower and fuel energy between 10 to 50 percent lower," he said.

Ir. Prof. Dr. Norman, whose team took two years to complete the research, stated that the ohmic pasteuriser system could be dismantled and reassembled in easy, portable parts.

"This pasteurising machine is most suitable for Small and Medium Industry Entrepreneurs who are constantly seeking alternatives in saving operational costs," he said.

Two Genius Inventions Win Special Jury Prizes on National Intellectual Property Day

Prof. Dr. Basyaruddin, from the Faculty of Science of Universiti Putra Malaysia (UPM), won a Special Jury Prize on National Intellectual Property Day through his product called 'The Sustainable and Solventless Surface Coatings', which is a toxic-free formulation produced from environmentally-friendly chemical technology and biotechnology surrounding wood or fibre in the electronic and domestic industry.

"The transparent coating is able to maintain the original surface and withstand abrasions and effects to chemical exposure," he said.

Meanwhile, the Director of the *Halal* Research Institute of Universiti Putra Malaysia (UPM), Prof. Dr. Yaakob Che Man, earned a Special Jury Prize for his product, 'The Rapid Analytical Technique for the Detection of Non-*Halal* Leather and Leather Products', which is a new and quicker method of detecting pig skin in leather products.

Prof. Dr. Mohd Basyaruddin and Prof. Dr. Yaakob with their teams showing their certificates.

These items, which are forbidden in Islam, are detected using the 'Fourier Transform Infrared' (FTIR) Spectroscopy and 'Scabbing Electron Microscope' (SEM) in order to assist *Halal* accreditation agencies such as the Department of Islamic Development Malaysia (JAKIM) and the *Halal* Industry Development (HDC).

The two scientists had been awarded the Special Jury Prizes on the National Intellectual Property Day 2009 (HHIN) recently.

The awards were given out by the Minister of Domestic Trade and Consumer Affairs, Datuk Seri Ismail Sabri Yaakob, at the prize giving ceremony organised by the Ministry of Domestic Trade and Consumer Affairs and the Intellectual Property Corporation Malaysia (MyIPO).

Malaysian Wins Gold in Geneva

Universiti Putra Malaysia's (UPM) scientist, Assoc. Prof. Dr. Sa'ari Mustapha won a gold medal for his product, 'New Prospective Polyurethane Clay Nanocomposites for Fire Retardant', a layer to be applied on concrete or wood that acts as a fire retardant during the 37th International Exhibition of Inventions, New Techniques and Products (INTPG) in Geneva, Switzerland, recently.

"The product invention is due to the rise of doubt on the usage of fire extinguishers and also driven by the increasing concern of building's safety from terrorists' sabotage. Hence, the demand for nanocomposite is deemed to be increasing in the future," he said.

He explained that the product is created using the green technology of polyurethane nanocomposite generated from seed oil.

Dr. Saari also bagged a silver medal for his research entitled 'Application of A Newly Synthesised Poly (Nipam) by Electron Beam Irradiation for Affinity Precipitation of Valuable Enzyme'.

A silver medal also went to a lecturer from the Department of Food Technology, Faculty of Technology and Food Science Technology, Prof. Dr. Jamilah Bakar, for her product called '*Halal* Collagen from Freshwater Fish Skins'.

She said the research that produced Halal collagen from freshwater fish skins has been widely used as core ingredients in the processing formulae of the food, pharmacy and cosmetic industry.

A bronze medal went to a researcher from the Plantation Crops Laboratory, Institute of Tropical Agriculture, Assoc. Prof. Datin Dr. Siti Nor Akmar Abdullah with her product "Leaf-specific Promoter from Oil Palm for Driving Leaf-specific Expression in Transgenic Plants".

The World First *Halal* Scientist

Prof. Yaakob: 'The first *Halal* Scientist'.

By having the main focus of ensuring that the country has the best standard of *Halal* system in the world in addition to being supportive to the cause, Prof. Dr. Yaakob Che Man, the Director of the *Halal* Research Institute, Universiti Putra Malaysia (UPM), has recently managed to be accredited as the first scientist to receive the *Halal* Scientist Award at the World *Halal* Research Summit 2009.

"My studies and research are strongly influenced by recurring issues that have constantly plagued the *Halal* industry and focusing on solving the problems faced. These efforts have been going on for the past ten years in developing the *Halal* industry," he said.

According to Dr. Yaakob, various advanced equipments, such as the '4 Dimensional Gas Chromatography Time of Flight Mass Spectrometer' (4D GC-TOF-MS), 'Fourier Transform Infrared Spectrometer' (FTIR), 'High Performance Liquid Chromatography' (HPLC), 'Gas Chromatography Flow Ion Detector' (GC-FID), 'Electronic Nose' (E-Nose), 'Differential Scanning Calorimeter' (DSC), conventional PCR and Real Time machines, as well as the 'Microplate Reader', are used to trace the prohibited sources.

He said further that the accreditation is based on the various studies and research done to trace products containing *haram* or forbidden sources in food, cosmetics and pharmaceutical products, which are strongly prohibited according to the Islamic Law.

"It has also become a method to ensure that the content in the various products are certified as being safe and therefore *Halal* certified and trusted all over the world," he said.

Dr. Yaakob added that researches conducted at the *Halal* Product Research Institute involved analysing food which contained gelatine, fat, pork and food containing alcohol.

By detecting the swine DNA through Real-Time PCR (Polymerase Chain Reaction), researchers were also awarded the National Intellectual Property Awards 2009 (AHIN'09) and also the Eureka Awards in Brussels, Belgium, recently.

His accreditation was awarded by Datuk Seri Najib Tun Razak, the Prime Minister of Malaysia at the MATRADE Exhibition and Convention Centre, Kuala Lumpur, in conjunction with the Malaysia International *Halal* Showcases (MIHAS) and the World *Halal* Research Summit 2009.

Beneficial Microbe and Gene Snatch a Gold Medal at ITEX 2009

Universiti Putra Malaysia (UPM) seized a gold medal at the Invention, Innovation and Technology Exhibition (ITEX) held recently in Kuala Lumpur Convention Centre (KLCC).

Dr. Sieo Chin Chin, from the Institute of Bioscience UPM, proudly walked away with the prize for her product 'Ruminants to Poultry: Beneficial Microbe and Gene'.

The Deputy Director of the Promotional Division, Research Management Centre UPM, Assoc. Prof. Dr. Irmawati Ramli stated that UPM won a gold medal, four silvers and four bronzes during the annual exhibition.

"Prof. Dr. Fakhru'l-Razi Ahmadun, from the Faculty of Engineering, won two silver medals, whilst Dr. Zanariah Abdul Majid (Faculty of Science) and Mohd. Shahrizal Dolah (Faculty of Design and Architecture) won silver respectively," she said.

The bronze medals went to Prof. Dr. Razak Alimon from the Faculty of Agriculture, Prof. Ir. Dr. Mohd. Amin Mohd. Soom (Faculty of Engineering), Dr. Nor Azah Yusof (Faculty of Science) and Assoc. Prof. Dr. Johnson Stanslas (Institute of Bioscience).

"Dr. Nor Azah Yusof was also awarded with the Malaysia Innovative Product Award with the product 'ImprintSorb for Selective Removal of Hg (II)' during the exhibition," she added.

ITEX received 577 participations that put to contest research products from 66 organisations of local or international public and private sectors. The event was co-organised by the Ministry of Science, Innovation and Technology (MOSTI), Ministry of Higher Education (MOHE) along with Ministry of Malaysian Education (KPM).

UPM representative is entertaining judges confidently.

Cancer: Early Detection Saves Thousands of Lives

The usage of the new invented component called 'Wire Mesh Collimator' can enhance the existing nuclear imaging machine in detecting cancer's cells activity in small sizes or at early stages.

Dr. M. Iqbal Saripan from the Computer and Communications Engineering Department, Faculty of Engineering, Universiti Putra Malaysia (UPM), is the inventor of the new component.

According to Dr. Iqbal, his collimator alters the conventional equipment in the 'Single Photon Emission Computed Tomography' (SPECT) nuclear imaging device which is currently being used in Europe and the United States. The 'Wire Mesh Collimator' weighs 39kg and 51kg compares to the conventional collimator which weighs 100kg.

Dr. Iqbal, whom took about seven years since 2002 to finish his research, has earned a gold medal at the Salon International Des Inventions 2008 Exhibition in Geneva and received the juries' special credit.

"The collimator was chosen because it contains more nuclear to detect any changes in the human body cells activity using the Exact Monte Carlo Method," he elaborated.

"The existing collimator currently used by hospitals worldwide can only detect 10 mm

Dr. Iqbal explains enthusiastically about his collimator to the media.

A New Hope for the Kota Marudu Community

A thorough check on the water quality of Kota Marudu's rivers.

The poverty rate at about 37.1%, the lack of optimum usage of mangrove and coast resource, threats from humans' activities, insufficient resources and development management plan of the mangrove, coastline and fisheries' activities, and the lack of proper infrastructure are the main problems of the Kota Marudu community.

According to government departments and non-governmental organisation, currently there is no source of expertise and financial help is also another major problem to in order to improve its livelihood.

Due to these problems, a group of Universiti Putra Malaysia (UPM) researchers have conducted a research on the biodiversity and the socio-economy of the community in the external area of the coastal of Kota Marudu, Sabah, to improve their livelihood recently.

Prof. Dr. Fatimah Yusof, the research programme leader, said their main objective is to improve the livelihood of the Kota Marudu society through the coast mangrove resource management and efficient fishing activities.

"This research opens up opportunities and economic activities that can be run by the government or related agencies such as mangrove and environmental-based tourism," she said.

The Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah, was also a member of the project. The project is funded by the National Oceanography Division (NOD), Ministry of Science, Technology, and Innovation (MOSTI) under the Science Fund.

According to Dr. Fatimah, the project is divided into three separate projects. The first project is to work on the ecosystem and socio economy improvement for the local community through the mangrove resources management and the project is led by Assoc. Prof. Dr. Awang Abd. Ghani.

The second project is the cohesive management of shoreline and riverbanks ecosystem being led by the Head Department of Environmental Studies, Assoc. Prof. Dr. Mohd. Kamil Yusof. The third project would be the collaborative management for Kota Marudu which will be headed by the Director of Agricultural and Food Policy Studies, Prof. Dr. Fatimah Mohamed Arshad.

All of the projects will be producing a *'Lestari'* mangrove forest management plan model which can be used as a guide to improve the usage of mangrove, coastal and fisheries resources to the optimum level, and also improve the livelihood of the local community. This management plan is hoped to be used by other mangrove forest in Malaysia.

Kota Marudu is chosen to be the research location because of its natural resources and nature that have a potential to be developed as a tourism destination. Kota Marudu is in the Coral Triangle Initiative that must be well preserved. 95% of the villagers of Kota Marudu rely heavily on fishing activities, mangrove resources, and mangrove ecosystem to earn their income.

The villagers have very high expectations of the project outcomes and are ready to give their full cooperation in all the activities conducted including at the planning level and formation of management and supervision plans.

cancer cells but my collimator can detect 1mm cells," he said to the media during the 2009 UPM Research Finding Promotion Ceremony.

Dr. Iqbal also said that hospitals do not have to spend RM5 million to buy a new machine but only spend RM30,000 in changing the collimator machine and the price will vary with commercialisation companies.

The invention also earned the Chairman Award, a gold medal from the Malaysian Nuclear Agency, and a silver medal in the Malaysian Technology Expo 2007.

Discovery on the Potential of Herb Plants

The Institute of Bioscience, Universiti Putra Malaysia (UPM), had organised a workshop on the introduction of Medicinal Plants, held at the institute of Bioscience UPM, to discover the potentiality and identify the methods of herb plants cultivation.

The Director of Institute of Bioscience Prof. Dr. Fatimah Md. Yusoff said the workshop also comprised practical training on new medicinal resources in Malaysia and to identify its potential use.

"The workshop also highlighted on the current herbs industry, aromatic plants, in-vitro plant breeding, herbs-based food, kitchen garden as well as an educational trip to the Agricultural Conservatory Park, (TKP)," she said during the opening ceremony of the workshop being officiated by UPM Deputy Vice Chancellor (Academic and International), Prof. Datin Paduka Dr. Aini Ideris.

Dr. Fatimah said the herb plants remedial benefits are not restricted to only for medicinal purposes or for the use of the local community. Instead, they should be shared with the whole public.

"Herb plants have been widely used, however, only a little is known on the remedial significance and how the cultivation should be properly practiced," she said.

Meanwhile, the coordinator of the Biodiversity Unit, Institute of Bioscience, Dr. Faridah Qamaruz Zaman said the Cancer National Council (MAKNA) is also contributing in term of funding the cancer research.

The Agricultural Conservatory Park was the inspiration of the Vice Chancellor, Prof. Datuk Dr. Nik Mustapha Raja Abdullah in 2006 as a garden refined with a collection of plants that holds economical value and to become a centre of reference to guarantee conservation.

***Mas Cotek*, a herb plant with its well-known medicinal properties.**

ICERP Attracts 10 Countries

The Deputy Minister of Higher Education, YB Dr. Hou Kok Chung throwing a big smile to the cameras while receiving a gift from UPM's Vice Chancellor, Prof. Datuk Dr. Nik Mustapha.

The International Conference on Educational Research and Practise (ICERP), hosted by the Faculty of Educational Studies, Universiti Putra Malaysia (UPM), had recently attracted participation from 10 countries including the locals. The conference was held at the Convention Hall Putrajaya Marriott Hotel.

The participants were from the United States, Australia, South Africa, New Zealand, Philippines, Iran, Taiwan, Pakistan, Sri Lanka and Singapore to partake in the 2-day convention which was held for the first time.

The conference, sponsored by Bank Rakyat Malaysia, witnessed the attendance of 70 international participants and 180 from Malaysia.

Aptly themed 'Enhancing Human Capital through Teacher Education', the conference aimed to discuss on current issues, challenges and to seek for the dynamic effect of an educator.

The Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah said the convention was an ideal educational platform for knowledge sharing and professional interaction between students and local trainers or ones from abroad.

"I believe that the outcome of the research and discussions will be able to assist us to escalate our productivity as well as the efficacy of each learning organization," he said.

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Papers should be double-spaced 12 point type (Times New Roman fonts preferred). The first page should include the title of the article but no author information. Page 2 should repeat the title of the article together with the names and contact information of the corresponding author as well as all the other authors. Page 3 should contain the abstract only. Page 4 and subsequent pages to have the text - Acknowledgments - References - Tables - Legends to figures – Figures, etc.

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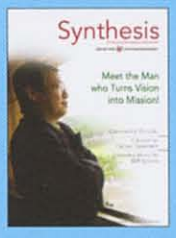

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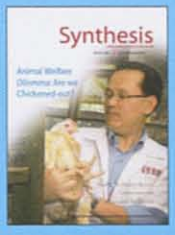

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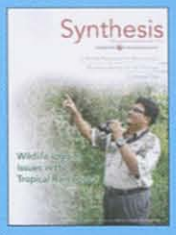

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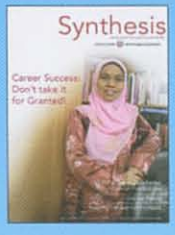

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