Synthesis

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Tunable Range Enhancement of Multi-wavelength Brillouin-erbium Fibre Laser for WDM Systems

Usage of CpG-free Plasmids for Gene Therapy - Reduced Inflammation and Sustained Pulmonary Gene Expression

MgB2 - The Next Generation of High Field Magnetic Material

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A New UWB Filter for Higher Speed Communication

Bifidobacterium pseudocatenulatum G4: A Potential Probiotic for Gut Health

A New VPO Catalyst for a Sustainable Environment

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Photographs courtesy of Ahmad Fua'ad Alwi

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Synthesis is the only quarterly R&D&C bulletin of Universiti Putra Malaysia published in March, June, September and December. It focusses on award-winning innovations and high impact publications. It covers research happenings that emerged from the various faculties and institutes across the university and provides a brief summary of some of the important research findings by UPM. It features special topics that are of national interest in various fields and disciplines.

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

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Letters to the Editors

If you have any comments about the content of the publication or contributions for the forthcoming issues, please send them to: The Editors, *Synthesis*, Publication Division, Research Management Centre, Tower II, UPM-MTDC Technology Centre, 43400 UPM, Serdang, Selangor, Malaysia or e-mail to fatimah@rmc.upm.edu.my. The editors reserve the right to edit articles before publication.

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Editorial

QUANTITY vs QUALITY IN ACADEMIC PUBLICATION

In recent years, many changes have taken place in Malaysian public universities. Probably the most interesting change among academicians is the implementation of Key Performance Indicators (KPI), especially in quantifying the publication requirements as academicians. UPM, as one of the research universities in Malaysia, is giving incentives to researchers who have published and exceeded the required KPI. Interestingly, the publication requirements for promotion to Associate Professor and Professor have also been quantified. This, hopefully, will clarify the number of publications needed by the academics before they could be considered for promotion or given the incentives.

There is no doubt that the quantification of publication requirements has eased the tension and partially clarified the publication issues for promotion. Criticisms on vague guidelines as to the number of publications for the promotion exercise and over-dependence on evaluations by deans and external evaluators have somewhat subsided. Now, academicians feel that they deserve to be promoted or given incentives once they achieved the required number of publications. Many have worked very hard to fulfill the KPI and publication requirements, some even aiming at getting the maximum amount of incentives. Unfortunately, while doing so, many forget about quality.

There are two crucial aspects in publication that should be considered. They are quantity and quality of publication. Quantifying the publication requirements has fortunately tackled the quantity aspect of evaluation. However, it is sadly not so in the case of quality. Academicians must be reminded that by fulfilling the number of publications, it does not mean that the candidate automatically deserves promotion or incentives. A high number of publications does not necessarily reflect high quality output. In hastily trying to fulfill the KPI or the number of required publications, a few academicians have abandoned quality and started cutting corners by publishing in new or questionable journals.

The quantity of publication should not be the ONLY criteria for promotion or incentives. The quality aspect is of utmost importance and must be maintained. A few professors, who previously acted as external evaluators for the promotional exercise by UPM, specifically looked for 4-5 publications in flagship journals related to the candidate's field before they recommended the candidate for professorship. This is a good example on how to evaluate the quality of publication and why selecting external evaluators is important in order to maintain the quality of promotion. We now have the ISI Thomson classification for journals for almost all fields and this can be used to determine the quality of publication. UPM is moving towards using the ISI Thomson classification for publication. By doing so, the quality of research and publications in UPM will be greatly enhanced. To fit the purpose, however, the publication criteria will have to be slightly modified. Unfortunately, without doubt, this change for the better will bring more dissatisfaction from few academic staff.

Prof. Dr. Mohd. Zamri Saad,
Deputy Director,
Publication Division,
Research Management Centre,
Universiti Putra Malaysia.

Facts & Figures

RESEARCH EXHIBITIONS AND AWARDS RECEIVED

In 2008, UPM sent 428 product participations and research outputs to be exhibited at international, national, and university level.

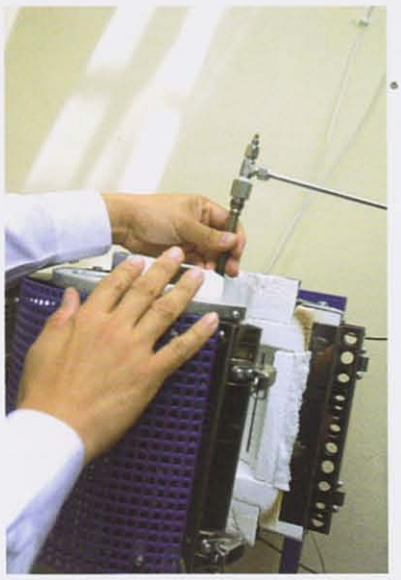
Graph 1: The Number of Awards Received in International Exhibitions, 2008

Graph 2: The Number of Awards Received in National Exhibitions, 2008

Award	Year 2008		
	Number of Participants	Number of Awards Received	Percentage of Success
International Exhibitions	25	25	100.0%
Special Awards (International)	25	3	
Sub Total	25	28	102.0%
National Exhibitions	54	43	79.6%
Special Awards (National)		4	
Sub Total	54	47	87.0%
University Exhibition (PRPI UPM)	349	286	81.9%
TOTAL	428	361	84.3%

Table 1: Total Number of Awards Received, 2008

A New VPO Catalyst for a Sustainable Environment



Catalysis plays a central role in the development of sustainable processes, which are of primary importance to allow the present and future worldwide production and use of energy and chemicals while avoiding negative consequences to the environment.

Future global prosperity will depend on new or improved processes that are economically and environmentally sustainable. Furthermore, the development of new catalysts and catalytic processes can open up to new selective chemical processes which may lead to a considerable reduction of undesired by-products or waste products. Selective catalytic oxidation is one of the major areas in industrial chemical production.

The possibility of developing new lower environmental impact and lower cost processes has recently generated interest in the transformation of light alkanes to valuable oxygenated compounds and alkenes by selective oxidation. This is due to the abundance and low cost of the light alkanes such as ethane, propane and butane.

However, the possible utilisation of alkane feedstocks for selective oxidation reactions requires the discovery of a selective catalyst for the reaction, a difficult task due to alkanes being largely less reactive than most of the possible reaction products. Thus, the selective oxidation of alkanes requires the development of novel concepts and catalytic systems to fulfill the strict requirements of controlled surface reactivity necessary for the selective behaviour.

The production of maleic anhydride (MA) from n-butane over vanadium phosphorus oxide (VPO) catalysts is as yet the only industrial application of alkane selective oxidation. This process typically achieves conversion of around 75% and selectivity near 67%. Maleic anhydride is a commercially important chemical intermediate for acquiring unsaturated polyester, succinic anhydride, ɣ-butyrolactone, 1,4-butanediol, tetrahydrofuran, fumaric acid, malic acid and d,l-tartaric acid. Vanadyl pyrophosphate catalysts have also been studied for several light hydrocarbons i.e. ethane, propane and pentane. Vanadyl pyrophosphate, $(VO)_2P_2O_7$ is the most active catalyst and obtained by activating the precursor, vanadyl phosphate hemihydrate, $VOHPO_4{\cdot}0.5H_2O$ at temperatures of 673–723 K. Vanadyl phosphate hemihydrate, $VOHPO_4{\cdot}0.5H_2O$, has tremendous technological importance as the precursor to vanadyl pyrophosphate, $(VO)_2P_2O_7$ or VPO which is used as the catalyst for the commercially established selective oxidation of n-butane to maleic anhydride. Vanadyl hydrogen phosphate hemihydrate is known to be crucial in determining the catalytic activity and selectivity of the produced vanadyl pyrophosphate. In fact, it is the surface area of the produced vanadyl pyrophosphate that affects the catalytic activity and selectivity because higher surface area implies higher number of active sites per unit mass of catalysts.

This new invented synthesised nanosized VPO catalyst has extremely high surface area (~ 50-65 m^2g^{-1}). This highly active catalyst has shown a direct linear relationship between conversion and the catalyst surface area. This implies that the surface structure of the activated catalysts is very similar and the differences are just due to the higher surface area. Higher surface area of VPO catalyst means having a higher number of active sites per unit mass of catalyst. The advantage of having a high surface area of VPO catalyst is that the catalyst can operate at lower temperature compared to the current industrial temperature (400°C) which leads to an enhanced selectivity and yield in product being obtained. This VPO catalyst was synthesised at a shorter preparation duration compared to the conventional VPO catalyst. Furthermore, it has potential use for other light alkanes oxidation.

The new synthesised nanoparticle VPO catalyst also showed different reducibility behaviour. Higher amount of active site (V^{4+}) and large amount of reactive oxygen species were given by the nanoparticle VPO catalyst. Both V^{4+} phase and associated oxygen species (O^-) were responsible for the activation of n-butane and contributed to the enhancement of the activity. Statistical analysis gave a good correlation coefficient ($R^2 = 0.9111$) suggesting that *n*-butane activity was highly dependent on the presence of V^{4+} phase. A smaller particle size at (020) plane being obtained for the new synthesised VPO catalyst strongly improved the MA selectivity.

Figure 1: High Surface Area VPO Catalyst

Y. H. Taufiq-Yap, C. K. Goh, G. J. Hutchings, N. Dummer and J. K. Bartley, 2006. Effects of Mechanochemical Treatment to the Vanadium Phosphate Catalysts Derived from $VOPO_4{\cdot}2H_2O$. Journal of Molecular Catalysis A: Chemical, 260, 24-3.

Y. H. Taufiq-Yap, A. A. Rownaghi, M. Z. Hussein and R. Irmawati, 2007. Preparation of Vanadium Phosphate Catalysts from $VOPO_4{\cdot}2H_2O$: Effect of Microwave Irradiation on Morphology and Catalytic Property. Catalysis Letters, 119, 64-71.

A. A. Rownaghi, Y. H. Taufiq-Yap and F. Rezaei, 2009. Influence of Rare-Earth and Bimetallic Promoters on Various VPO Catalysts for Partial Oxidation of n-Butane. Catalysis Letters, 130, 504-516.

Y. H. Taufiq-Yap, C. K. Goh, G. J. Hutchings, N. Dummer and J. Bartley, 2009. Dependence of n-Butane Activation on Active Site of Vanadium Phosphate Catalysts. Catalysis Letters, 130, 327-334.

A. A. Rownaghi, Y. H. Taufiq-Yap and F. Rezaei, 2009. High Surface Area Vanadium Phosphate Catalysts for n-Butane Oxidation. Industrial and Engineering Chemical Research, 48, 7517-7528.

Expert's Snapshots

Professor Taufiq Yap currently is the Coordinator for the Centre of Excellence for Catalysis Science and Technology (PutraCAT). His research interest is selective oxidation catalysis, development of heterogeneous catalysts for biodiesel production, dry reforming of methane and biomass conversion to syngas and [illegible]. He has authored and co-authored a total of 130 [illegible] various international and national refereed journals and filed [illegible] patents. He is currently a member of the Editorial Board for Catalysis Survey from Asia and Bulletin of Catalysis Society of India, and the International Advisory Board for the Bulletin of Chemical Reaction and Catalysis. Professor Taufiq Yap has received the prestigious Young National Scientist Award by the Malaysian Ministry of Science, Technology and Innovation in 2002. He received the Outstanding Young Malaysian Award 2008 for the Science and Technology Development category from the Junior Chamber International Malaysia and the MASS Young Researcher Award 2008 from the Malaysian Solid State Science and Technology Society (2008). Professor Taufiq Yap was also a Fellow of the Royal Society of Chemistry (FRSC), United Kingdom in 2008. Recently, he was appointed as the Fellow of the Malaysian Institute of Chemistry (2009). He is currently a committee member of the Asia Pacific Association of Catalysis Societies (APACS).

GOLD *Malaysian Technology Expo (MTE 2008)*
SILVER *36th International Exhibition of Inventions of Geneva, 2008*
BRONZE *18th International Invention, Innovation and Technology Exhibition (ITEX 2007)*

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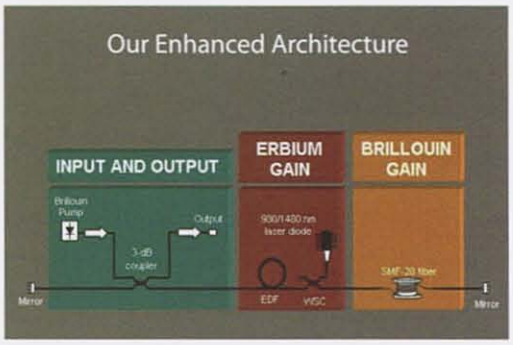
Tunable Range Enhancement of Multi-wavelength Brillouin-erbium **Fibre Laser for WDM Systems**

Title	:	Tunable Range Enhancement of Brillouin-erbium Fibre Laser Utilising Brillouin Pump Pre-amplification Technique
Author	:	M. H. Al-Mansoori and **M. A. Mahdi**
Journal	:	Optics Express
Volume	:	16
Issue	:	11
Page	:	7649 - 7654
Impact Factor:		**3.880**



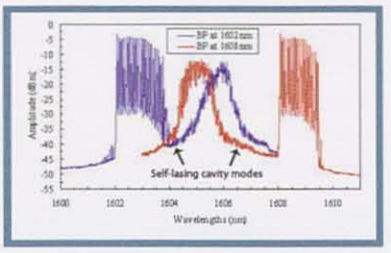
Multi-wavelength fibre laser sources are one of the attractive solutions to support dense wavelength division-multiplexed (WDM) systems. Multi-wavelength Brillouin-erbium fibre laser (BEFL) can be achieved by integrating Brillouin gain and optical amplification in erbium-doped fibre in the same laser cavity. Previous works have demonstrated the generation of multiple Brillouin Stokes lines in the order of tenth counts. The efficiency of generating multiple Stokes lines is proportional to the intensity of Brillouin pump (BP). In addition, the tuning range of multi-Stokes lines is limited owing to mode competition generated from the laser cavity itself due to spatial hole burning effects.

In this research, an enhanced multi-wavelength BEFL with pre-amplified Brillouin pump within the linear cavity is proposed. The proposed BEFL structure consists of a linear cavity formed by two reflecting mirrors at both ends of the resonator. The proposed fibre laser eliminates the requirement for high external BP power to create the Brillouin gain because the laser system can amplify the BP within the laser cavity before entering the single-mode fibre for Brillouin Stokes generation. The fibre laser structure is efficient in generating multiple lines due to double-pass Stokes amplification in erbium-doped fibre and bidirectional Stokes lines generation in the single mode fibre. Contrary to the previous laser structure, lower BP power is required to suppress the laser cavity modes and it also exhibits lower threshold power to generate the first Brillouin Stokes line. In addition to these findings, the tuning range of the proposed fibre laser is also widened. In the experiment, the EDF gain block is forced to operate into a deep saturation regime with respect to the BP intensity.

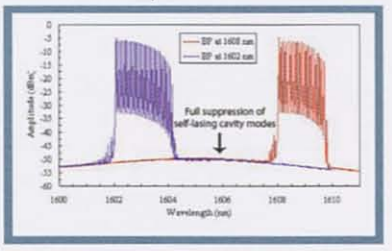
Impact Factor: 3.880

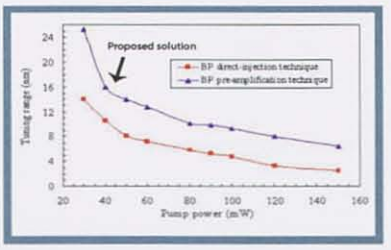
As a result, the self-lasing cavity modes experience gain compression, and consequently, these unwanted cavity modes are efficiently suppressed in a wider wavelength range. Thus, the homogeneous saturation of the EDF gain plays a dominant role in having wider tuning ranges and stable laser operation. In the research, the proposed fibre laser structure is able to produce more than 30 stable Stokes lines either in conventional-band (1530 ~ 1565 nm) or long-wavelength-band (1570 ~ 1605 nm) with 10.5 GHz spacing and has potential to be used as a multiwavelength source for WDM systems.

Problem from Previous Work



Our Proposed Solution





SILVER *EUREKA, Brussels, Belgium (2008)*
SILVER *Malaysian Technology Expo (MTE 2007)*
GOLD *UPM Invention, Research & Innovation Exhibition (PRPI 2006)*

Research Publication's Recognition (2004)
Paper entitled "Multi-wavelength Brillouin-erbium Fibre Laser in a Linear Cavity", published in the Optics Communications has been listed in the ScienceDirect Top 25 Hottest Articles between October and December 2004. This indicates ScienceDirect users' 25 most frequently downloaded journal articles from any selected journal.

***Patent Pending**: PI 20084189*

M. H. Al-Mansoori, B. Bouzid, B. M. Ali, M. K. Abdullah and M. A. Mahdi, 2004. Multi-wavelength Brillouin-erbium Fibre Laser in a Linear Cavity. Optics Communications, 242, 1-3, 209-214.

M. H. Al-Mansoori, M. K. A. Rahman, F. R. M. Adikan and M. A. Mahdi, 2005. Widely Tunable Linear Cavity Multiwavelength Brillouin-erbium Fibre Laser. Optics Express, 13, 9, 3471-3476.

M. H. Al-Mansoori and M. A. Mahdi, 2008. Tunable Range Enhancement of Brillouin-erbium Fibre Laser Utilising Brillouin Pump Pre-amplification Technique. Optics Express, 16, 11, 7649-7654.

M. H. Al-Mansoori and M. A. Mahdi, 2009. Multi-wavelength L-band Brillouin-erbium Comb Fibre Laser Utilising Nonlinear Amplifying Loop Mirror. Journal of Lightwave Technology, 27, 22, 5038-5044.

M. H. Al-Mansoori, M. A. Mahdi and M. Premaratne, 2009. Novel Multiwavelength L-Band Brillouin-erbium Fibre Laser Utilising Double-pass Brillouin Pump Preamplified Technique. IEEE Journal of Selected Topics in Quantum Electronics, 15, 2, 415-421.

Reader Enquiry
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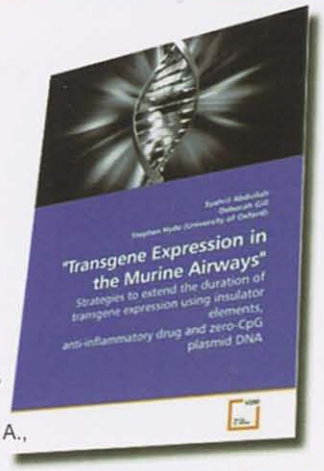
Usage of CpG-free Plasmids for Gene Therapy

- Reduced Inflammation and Sustained Pulmonary Gene Expression



A gene is a discrete sequence of DNA that codes for a protein. Sometimes a gene may go defective or missing, which may cause production of a non-functional protein or no protein being made. Genetic diseases are caused by the abnormalities of the gene in producing a healthy protein. In theory, this functional gene defect or loss can be corrected by delivering a healthy gene to human tissues or by the expression of "therapeutic genes" to target tissues, which can consequently eliminate the root cause of the disease. This experimental approach is known as "Gene Therapy".

Title: CpG-free Plasmids Confer Reduced Inflammation and Sustained Pulmonary Gene Expression
Author: Hyde S. C., Pringle I. A., **Abdullah S.**, Lawton A. E., Davies L. A., Varathalingam A., Nunez-Alonso G., Green A-M., Bazzani R. P., Sumner-Jones S. G., Chan M., Li H., Yew N. S., Cheng S. H., Christopher Boyd A., Davies J. C., Griesenbach U., Porteous D. J., Sheppard D. N. and Munkonge F.
Journal: Nature Biotechnology
Volume: 26
Issue: 5
Page: 549 - 551
Impact Factor: 22.672

Many "proof-of-concept" studies have shown the feasibility of gene therapy to treat genetic diseases. However, there are still a number of problems with gene therapy that need to be solved before this type of treatment becomes a reality. Two of the main problems of gene therapy are (i) the short-lived duration of the therapeutic gene expression, and (ii) the induction of inflammatory responses. Frequently, the inflammatory responses can rise to a level that can endanger the host by shutting down a few vital organs. These two problems are actually interconnected. As the therapeutic gene is introduced to the diseased tissues, the host will recognise this gene as foreign, and set-off a massive production of pro-inflammatory cytokines. These pro-inflammatory cytokines interact with the regulatory sequence (promoter) on the therapeutic gene, thereby inhibiting the gene from being expressed.

Impact Factor: 22.672

Another way the host can repress the expression of the therapeutic gene is by the addition of a chemical group (methyl) on the cytosine of the DNA sequence of the gene, a phenomenon known as DNA methylation. Methyl-binding proteins bind to these methylated sequences, consequently impeding the binding of transcriptional proteins to the gene. The induction of the inflammatory responses and the methylation of the foreign DNA sequences to silent the gene are defensive mechanism systems to protect the host from deleterious invaders. The host recognises the therapeutic gene as foreign as the CpG (cytosine-phosphate-guanosine) sequences on the DNA are not methylated.

S. C. Hyde, I. A. Pringle and S. Abdullah, et al, 2008. CpG-free Plasmids Confer Reduced Inflammation and Sustained Pulmonary Gene Expression. Nat. Biotechnol, 26(5), 549-51.

S. Abdullah, D. R. Gill and S. C. Hyde, 2009. Transgene Expression in the Murine Airways-strategies to Extend the Duration of Transgene Expression using Insulator Elements, Anti-inflammatory Drug & Zero-CpG Plasmid DNA. Saarbrucken, (Germany): VDM Verlag Dr. Muller.

I. A. Pringle, S. C. Hyde and D. R. Gill, 2009. Non-viral Vectors in Cystic Fibrosis Gene Therapy: Recent Developments and Future Prospects. Expert Opin Biol Ther., 9(8), 991-1003.

G. McLachlan, B. J. Stevenson and D. J. Davidson, et al, 2000. Bacterial DNA is Implicated in the Inflammatory Response to Delivery of DNA/DOTAP to Mouse Lungs. Gene Ther., 7(5), 384-92.

B. L. Hodges, K. M. Taylor and M. F. Joseph, et al, 2004. Long-term Transgene Expression from Plasmid DNA Gene Therapy Vectors is Negatively Affected by CpG Dinucleotides. Mol Ther., 10(2), 269-78.

Based on this knowledge, this study had identified two ways to solve the problem by using a methylated or a zero-CpG therapeutic gene. As this was a pre-clinical study, we substituted the therapeutic gene with a reporter gene to prove the practicality of this concept in the lung of a mouse. The introduction of methylated CpG reporter gene did not show any improvement in the level or duration of gene expression, despite the lower induction of pro-inflammatory responses. However, with the introduction of a synthetically made zero-CpG sequence of the same reporter gene, the level of the gene expressed was unusually high and was sustained for a longer period of time, compared to the non-modified reporter gene. As a bonus, the induction of the inflammatory responses was not detected. The outcomes from this study are so monumental in the field of gene therapy as it can pave ways to the production of effective and safe therapeutic genes to be used in this treatment approach. Following up from this study, currently, a cystic fibrosis gene therapy clinical trial is being held in the UK to measure the effectiveness of the zero-CpG therapeutic gene in a real life situation.

No treatment is without risks; therefore, the risks of gene therapy must be balanced against its potential benefits. Until gene therapy is proven safe and effective, it will remain an experimental treatment used in clinical studies. For the detailed description of the study, please obtain the book entitled "Strategies to extend the duration of transgene expression using insulator elements, anti-inflammatory drugs & zero-CpG plasmid DNA", VDM Verlag Dr. Muller (Saarbrücken, Germany). You can purchase it online at Barnes & Nobles, Amazon.com, and Blackwell websites.

Lez Fairbairn Award at the 3rd Annual British Society of Gene Therapy Conference London (2006) for the most promising research area.

Reader Enquiry
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MgB_2 – The Next Generation of High Field Magnetic Material

Relatively low costs of fabrication, high critical currents and fields, $J_c(H)$, large coherence lengths, high critical temperature, T_c, of 39 K and absence of weak links make MgB_2 a promising material for applications at above 20.13 K, the temperature of boiling hydrogen at normal pressure.

The effect of SiB_4 addition on crystal structure, phase formation T_c and $J_c(H)$ in MgB_2 was investigated. X-ray diffraction micrographs (Fig. 1) showed that some amount of SiB_4 decomposed into Si and reacted with Mg to form Mg_2Si phase. Hence, high annealing temperature played a major role in eliminating unreacted Mg and produced a higher MgB_2 fraction. The presence of SiB_4 into MgB_2 led to the formation of impurities. The lattice parameter and the superconducting transition (T_c) were not significantly affected for SiB_4 particles addition up to 5.0 wt%.

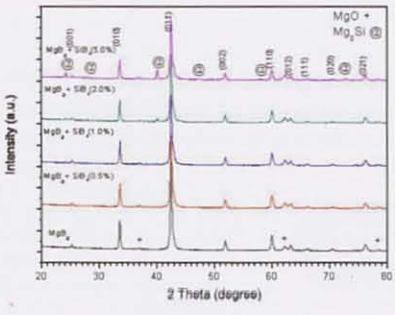

Figure 1:
XRD Patterns of MgB_2 with SiB_4 Addition Annealed at 800°C

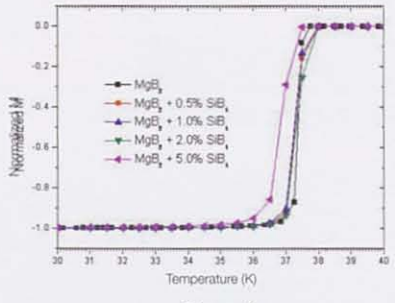

Figure 2:
AC Susceptibility Measurement on SiB_4 Added MgB_2 Annealed at 800°C

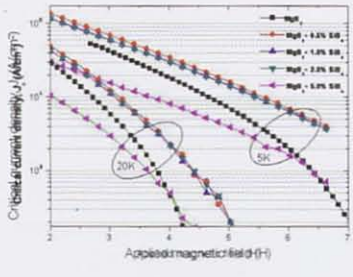

Figure 3:
Critical Current Density as a Function of Applied Magnetic Field at 5K and 20K for SiB_4 Added MgB_2 Annealed at 800°C

Table 1: Comparison of J_c at 5K and 20K for SiB_4 Addition on MgB_2 Annealed at 800° C

Sample	Field (T)	J_c (A/cm^2) (5K)	Field (T)	J_c (A/cm^2) (20K)
MgB_2	3 T	4.0×10^4	2 T	2.8×10^4
	5 T	6.6×10^3	3 T	5.8×10^3
	6 T	1.8×10^3	4 T	4.5×10^2
MgB_2 + 0.5% SiB_4	3 T	6.9×10^4	2 T	4.8×10^4
	5 T	1.6×10^4	3 T	1.2×10^4
	6 T	6.7×10^3	4 T	2.2×10^3
MgB_2 + 1.0% SiB_4	3 T	5.9×10^4	2 T	4.2×10^4
	5 T	1.4×10^4	3 T	1.1×10^4
	6 T	6.3×10^3	4 T	2.2×10^3
MgB_2 + 2.0% SiB_4	3 T	5.9×10^4	2 T	4.2×10^4
	5 T	1.4×10^4	3 T	1.1×10^4
	6 T	6.3×10^3	4 T	2.1×10^3
MgB_2 + 5.0% SiB_4	3 T	1.5×10^4	2 T	1.0×10^4
	5 T	3.9×10^3	3 T	3.0×10^3
	6 T	1.6×10^3	4 T	4.9×10^2

It was found that the addition of SiB_4 enhanced J_c but slightly depressed T_c, (Fig. 2) which is consistent with other recent reports. By controlling the processing parameters, an optimised $J_c(H)$ increased with SiB_4 addition (Fig.3). MgB_2 sample showed significant enhancement of J_c with the addition of SiB_4. Under these conditions, the optimum SiB_4 addition level for obtaining high critical current density was 0.5 wt% for annealing temperature of 800°C. However, $J_c(H)$ of SiB_4 added MgB_2 degraded after 5.0 wt% of addition. Table 1 summarises the critical current density, J_c, at various applied fields.

Fabrication of long length MgB_2 conductors is relatively easy and less expensive as compared to High Temperature Superconductor (HTS) such as YBCO and BSSCO. The conductors have much better mechanical properties for practical applications. In fact, MgB_2 has potential as the next generation high field magnetic material and is a strong competitor for the currently used NbTi and Nb_3Sn conductors. Besides the magnet applications, MgB_2 conductors have potential uses in superconducting transformers, rotors and transmission cables at temperatures of around 25 K, at fields of 1 T.

M. A. M. Faisal, S. A. Halim, S. K. Chen, R. Abd-Shukor, M. M. Awang Kechik, M. I. Adam, K. P. Lim, M. M. Kamarulzaman, S. S. H. Ravindi, H. Baqiah and S.W. Ng, 2009. Experimental Study on the Phase Formation of MgxB2 (x=0.8, 1.0,1.2). J. of Fundamental Science, 5, 1-6.

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S. K. Chen, K. P. Lim, K. B. Tan and S. A. Halim, 2009. Comparative Study on the Critical Current Density of MgB_2 Prepared by Mixed Boron Powders. Solid State Science and Technology, 17, 1, 173-181.

S. K. Chen, K. P. Lim, M. A. M. Faisal and S. A. Halim, 2008. Enhanced Critical Current Density in MgB_2 with Dy2O3 Particle Additions. Sains Malaysiana, 37, 3, 223-225.

GOLD *UPM Invention, Research & Innovation Exhibition (PRPI 2008)*

Reader Enquiry
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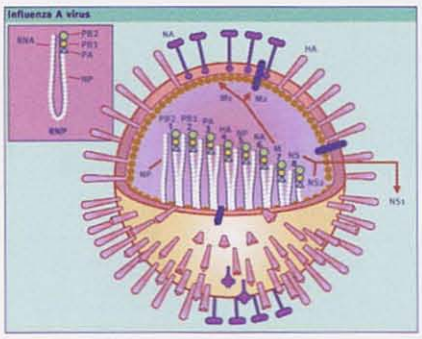
Emerging Infectious Diseases -

A Peril to the Livestock Industry



The livestock industry is one of the most vital agricultural sectors in Malaysia and its protection in terms of disease control is pivotal in ensuring our food security. However, the occurrence of infectious emerging and re-emerging diseases in livestock has threatened the growth of this industry. Diseases in animals may affect human health in several important ways. They may affect human health directly through zoonoses (communicable diseases between animals and humans) and food borne infection, or they may disrupt the country's livestock and livestock product trade due to import and export trade requirements. Recent years have seen the rise of many new diseases, and the re-emergence of others which were once thought to have been brought under control. Some of the important problems in the local livestock industry are related to the emergence of vancomycin-resistant enterococci (VRE), Nipah virus disease and Swine influenza

Vancomycin-resistant enterococci (VRE) is a group of bacteria that has resulted in much anxiety among the local poultry farmers. VRE has been incriminated in several fatal nosocomial (hospital-based) infections worldwide. Moreover, VRE may transfer its antibiotic resistant genes to other potentially important human pathogens, which may result in severe non-treatable infections. One of the sources of VRE is believed to be animals, especially food livestock. However, this belief has been debated in many platforms due to conflicting and inconclusive evidence. Any detection of the organism may cause the Malaysian export poultry products to be banned or rejected. Therefore, a series of studies on VRE were conducted within selected animals and human populations of a few states in the Peninsular of Malaysia. Several molecular tools such as RAPD and MLST were used to determine the relation of the VRE strains found in poultry to that found in healthy and clinically affected humans. The study is expected to provide evidence as to whether there is any link between VRE in poultry with those found in humans in Malaysia. The findings from this study are anticipated to assist the authorities at the Department of Veterinary Services in dealing with trade related issues of exported poultry products.

Nipah disease is caused by a novel virus discovered in pigs that later spilled over to humans in contact with pigs, resulting in many tragic deaths. Based on epidemiological and virological evidence, fruit bats were regarded as the reservoir host. To understand the ecology and epidemiology of the disease, fruit bats were studied in a series of longitudinal and repeated cross-sectional investigations. From the studies, much insight was gained into the behaviour of the virus within the host, shedding patterns of the virus and mode and rate of viral transmission within the bat colony. This study has narrowed the gap of information that is so vital in order to understand the mechanics of *Nipah* disease transmission and hence provide potential ways in which the disease may be prevented.

Swine influenza is a disease that is common in many swine populations in the temperate parts of the world. The disease was once unheard of in Malaysia, even among the local pig farmers. In 2005-2007, our research team conducted a study among the local pig populations in Peninsular Malaysia with the aim to establish whether the local pigs have had any exposure to the various strains of influenza viruses, and identify some of the important factors that might influence the exposures. The study was completed with important baseline information about the type of influenza virus (classical swine influenza A H1N1, H3N2) circulating among the pig populations, prevalence rate, distribution and important risk factors for exposure of pigs to the disease. The findings from the study are currently being used by relevent authorities as a basis for follow-up surveillance on influenza among pigs in Malaysia, in lieu of the novel (pandemic) Influenza A H1N1. Ironically, at that time, H5N1 (bird flu) was purported to be the next agent for pandemia.

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R. Suriya, L. Hassan, A. R. Omar, I. Aini, C. G. Tan, Y. S. Lim and M. I. Kamaruddin, 2008. Seroprevalence and Risk Factors for H1N1 and H3N2 Influenza A Viruses in Pigs of Peninsular Malaysia. Zoonoses and Public Health, 55, 342-351.

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Travel and Conference Grants by International Foundation for Science 2008

GOLD UPM Invention, Research & Innovation Exhibition (PRPI 2008)

SILVER (2 Awards) UPM Invention, Research & Innovation Exhibition (PRPI 2007)

Asian Veterinary Science Prize (Asian Association of Veterinary Schools Award Winner) 2006

Travel and Conference Grants by International Foundation for Science 2005

Reader Enquiry

Latiffah Hassan, Yitbarek Getachew Molla, Sohayati Abdul Rahman, Suriya Kumari Ramiah, Sharifah Syed Hassan, Zunita Zakaria, Abdul Rahman Omar, Siti Suri Arshad, Saleha Abdul Aziz and Aini Ideris

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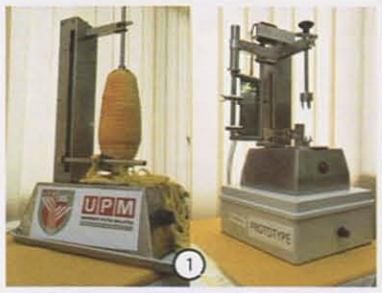
BioMalaysia Exhibition 2009

1. The Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah with some UPM researchers.
2. Some of the UPM products exhibited at the BioMalaysia 2009.
3. Judges on their rounds.
4. Exchanging opinions at BioMalaysia 2009.



Fruits Grater and Peeler

1. An award-winning fruits peeler and grater invented by Dr. Siti Mazlina.
2. Dr. Siti Mazlina demonstrating some functions of her invention.
3. Dr. Siti Mazlina (right), together with her co-researchers, demonstrating the uses of the fruits peeler to the media.

New Food Products from UPM

1. The winning team, GreeNice Confectionary Sdn. Bhd., with their delicious "1-Gaga Herbal Ice Cream".
2. Students, from the Faculty of Food Science and Technology, distributing new food products to visitors.

ICC ACTIVITIES

The Biochar Carbonator (UPM Technofund Project)

1. The Minister, Datuk Seri Maximus Johnity Ongkili and Deputy Secretary General (Science Services), Prof. Datin Paduka Dr. Khatijah Mohd. Yusoff, from MOSTI, during a visit to Dengkil, Selangor.
2. Biochar cubes from palm oil empty fruit bunch (EFB).
3. The new plant being used to produce biochar cubes from EFB.

Delegation from the Philippines (2 Oct. 2009)

A delegation from the Philippines visited ICC to know about UPM's commercialisation processes.

Delegation from Pakistan (20 Nov. 2009)

A delegation from Pakistan visited ICC to learn about IP Management.

National Innovation Award for UPM

1. The "CardioMate" by Prof. Dr. Suhaila Mohamed made UPM proud at the NICE Award 2009.
2. Prof. Dr. Suhaila Mohamed receiving a cheque from Datuk Dr. Maximus Johnity Ongkili at PWTC.

A Hand to Amplify Forestry Research In Sarawak

The Vice Chancellor of UPM exchanging documents with the Director of Sarawak Forestry Department, Datu Hj. Len Talif Salleh, while the Second Minister at the Chief Minister's Office, Mohd. Naroden Majais, (centre) looks on.

R&D&C HAPPENINGS

Gathering of Researchers at ICELT 2009

1. Visitors flipping through some of the books being exhibited at the ICELT 2009.
2. Participants from all over the world attending the ICELT 2009.
3. One of the presenters giving his paper presentation to the participants of ICELT 2009.
4. Lucky recipients of the scholarship scheme sharing a light moment (from left) Abdullah Omar, Irawaty Herlina Md. Solehan and Muhammad 'Uthman Omar.

PECIPTA 2009 - UPM Grabs 16 Medals

1. Some of UPM's products.
2. Y. B. Dato' Seri Mohamed Khaled Nordin listening to Assoc. Prof. Dr. Amin Ismail.
3. A bright red colour was chosen by UPM to provide some excitement at PECIPTA 2009.
4. Assoc. Prof. Dr. Lai Ooi Ming trying her best to make her booth attractive and well-organised.

Young Trees for the Young Generation

1. The Deputy Vice Chancellor (Academic & International), Prof. Datin Paduka Dr. Aini Ideris (right), with Prof. Dr. Akira Miyawaki (left), planting a young tree.
2. The collaboration of UPM, Yokohama National University, Japan (YNU) and Mitsubishi Corporation, Japan for enviromental protection.

STEDex' 09 - A Positive Impact on the Malaysian Design Industry

1. Prof. Dato' Dr. Ir. Radin Umar Radin Sohadi trying to get some input at the STEDex' 09.
2. An exhibitor giving his briefing to the visitors at the STEDex' 09.
3. The Dean from the Faculty of Design and Architecture, Assoc. Prof. Dr. Osman Mohd. Tahir, explaining the Virtual Library Museum Pages (VLMP) to the Director General, Department of Higher Education, Prof. Dato' Dr. Ir. Radin Umar Radin Sohadi and the Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah.

UPM to Increase Awareness on Animal Welfare

1. A few of the exhibitors' booths during the International Conference on Animal Health and Human Safety.
2. The VC of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah, receiving a token of appreciation from the Faculty of Veterinary Medicine, UPM.
3. Participants from various countries at the International Conference on Animal Health and Human Safety.

NewsBriefs

UPM Grabs 16 Medals in PECIPTA 2009

From left: Encik Wira Hidayat Mohd. Saad, Assoc. Prof. Dr. Irmawati Ramli, Assoc. Prof. Dr. Foo Hooi Ling, Assoc. Prof. Dr. Loh Teck Chwen and Prof. Dato' Dr. Abu Bakar Salleh at PECIPTA 2009.

UPM won a total of 16 medals in the recent PECIPTA 2009 held at University Malaya. The medal tally consisted of 3 gold, 6 silver and 7 bronze. This year's PECIPTA witnessed 500 research discoveries with participations from 28 IPTAs and IPTSs as well as from the corporate sectors.

UPM submitted 33 participations with 17 entries under the A Category, 8 for B Category, 3 for C Category (Invention for Display) and 5 for D Category (Commercial Product). UPM won its gold medal through Dr. Loh Teck Chwen from the Faculty of Agriculture under the A Category with his product called "Novel Broiler Feed Additive derived from Metabolites of Lactobacillus sp Isolated from Malaysian Foods", a natural product from a local delicacy extracted microbe. He said that the product could be consumed as an additive in animal feed, especially for livestock such as poultry, as a substitute to antibiotics and also acts as a growth enhancer.

"The product is able to increase growth of poultry, by about 4-5%. It is proven to be much better than antibiotics and probiotics as it does not leave any residue in the flesh," he said further.

Assoc. Prof. Dr. Lai Oi Ming from the Faculty of Biotechnology and Biomolecular Sciences with the product called "Novel Process for Production of Palm-based Diacylglycerols" and Dr. M. Iqbal Saripan from the Faculty of Engineering with his "Early Cancer Detection using Wire Mesh Collimator Gamma Camera" invention both earned a gold each under the B category. PECIPTA is a biannual expo organised by the Malaysian IPTAs in collaboration with the Ministry of Higher Education.

Fruits, Anyone?

Dr. Siti Mazlina Mustapha showing the awards received for her invention called "Fruits Peeler and Grater".

A new multifunctional fruit device called the "Fruits Peeler and Grater" was invented by researchers from the Faculty of Engineering, Universiti Putra Malaysia (UPM). The product's special feature is that the processes of grating, peeling and slicing fruits are automated.

The Head Researcher, Dr. Siti Mazlina Mustapa Kamal, said that the device is not only hygienic in nature but it also saves time and efficiency in terms of peeling pace, hence significantly reduces operational cost. "The device, estimated between RM100 and RM150, is suitable for fruits of various sizes including exotic ones such as dragon fruit. As for vegetables, it can be used on cucumbers, potatoes and tapiocas," she disclosed in a press conference held in UPM. Her future plan is to commercialise her invention.

National Innovation Award for UPM

"Cardio-Mate", a type of health food produced by Universiti Putra Malaysia (UPM) won the National Innovation Conference and Exhibition (NICE) Award held recently at the Putra World Trade Centre under the Waste to Wealth category.

The head of the UPM research team, Prof. Dr. Suhaila Mohamed said "CardioMate – A Waste to Wealth Product from Seaweeds and Palm Leaf Extract" had been tested of its efficiency on humans and animals where it indicated positive results to support the prevention of cancer, organ damage, cardiovascular disease, high blood pressure, diabetes and rapid wound healing as well as preventing the increasing level of cholesterol. "The product is ready to be marketed due to its proven efficiency on both humans and animals," she said confidently.

The opening ceremony was officiated by the Prime Minister of Malaysia, Datuk Seri Najib Tun Razak and the award presentation was officiated by the Minister from the Ministry of Science, Technology and Innovation (MOSTI), Datuk Dr. Maximus Johnny Ongkili. The award ceremony, hosted by MOSTI, was attended by 200 participants from various schools, institutions and the public and was aimed to promote novel innovation at all institutional levels. The research team members, which are from the Faculty of Food Science and Technology, are Dr. Noordin Mohamed Mustapha, Patricia Matanjun, Juliana Jafri, Farideh Namvar, Intan Natasya Ahmad, Samaneh Ghasemi Fard, Mursyida Abdul Razak, Maslia Manja Badruzzaman and Rosalina Tan Roslan Tan.

A Hand to Amplify Forest Research In Sarawak

The government of Sarawak, represented by the Sarawak Forest Department, and Universiti Putra Malaysia (UPM) signed a Memorandum of Understanding to pool resources in forestry disciplines mainly for research, consultation and training to further enhance the management of sustainable forests in the state. The MoU was signed by the Deputy State Secretary, Assistant Minister of Planning and Resource Management cum the Director of Sarawak forest Department, Datu Hj. Len Taif Salleh, who represented the Sarawak Government and the Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah.

The MoU was signed by the Deputy State Secretary, Assistant Minister of Planning and Resource Management, Datu Hj. Len Taif Salleh, representing the Sarawak Government while UPM was represented by the Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah.

"UPM sets high standards in developing research in the fields of forestry science mainly forest biology, ecology function, carbon sequestration, recreational forest and eco-tourism, the socio-economic aspect and also the sustainable forest management," said Prof. Datuk Dr. Nik Mustapha R. Abdullah. UPM can use the facility to conduct research in some of the state's abundant forests such as the Bukit Lambir Reserve. He also disclosed that a number of projects had been outlined by the Faculty of Forestry and Institute of Tropical and Forest Products, in UPM.

The MoU, apart from bridging the gap between both parties in terms of research, consultation and services, will also provide opportunity for staff to further their studies in relevant fields and improve their human capital. The event, which took place at the Riverside Majestic Hotel Kuching, was witnessed by Mohd. Naroden Majais, the Second Minister at the Chief Minister's Office (Bumiputera Entrepreneur Development) and Second Minister of Planning and Resource Management.

BioMalaysia Exhibition 2009

A UPM researcher explaining the impact of her research to the judges at BIOMALAYSIA 2009.

Researchers from Universiti Putra Malaysia (UPM) walked away with 2 gold, 2 silver and 6 bronze medals at the BioMalaysia 2009 Exhibition which was officiated by the Prime Minister of Malaysia, Dato' Seri Najib Tun Abdul Razak at the Kuala Lumpur Convention Centre (KLCC).

Prof. Ir. Dr. Amin Mohd. Soom, from the Faculty of Engineering, won the first gold medal through "Real Time Mapping using Apparent Electrical Conductivity (RT-MECa)" which is used to observe the soil variability in a field at real time.

The second gold medal went to Prof. Dr. Fauziah Othman from the Faculty of Medicine and Health Science. Her invention, "*Barberis vulgaris* Fruit Extract as a Potential Prevention Agent for Liver Cancer", can be taken as a supplement and sold at a reasonable price.

The 2 silver medals went to Prof. Dr. Aini Ab. Shukor from the Institute of Tropical Forestry and Forest Products for her invention entitled "Over Expression of Gibberelin 20 Oxidase Gene Increase of Cellulose Fibre Length in *Kenaf* (*Hibiscus cannabinus L*)" and Dr. Rajesh Ramasamy from the Faculty of Medicine and Health Sciences for his product called "Generation and Characterisation of Mesenchymal Stem Cells Derived from Human Myocardiac Tissues: A Potential Pool of Cardiac Stem Cells", respectively. The bronze medals went to Assoc. Prof. Dr. Tey Beng Ti (two medals) from the Faculty of Engineering with "The Method for Quantitation of Recombinant Green Fluorescent Protein" and "A Method for Purifying the Nucleocapsid Protein of *Nipah* Virus"; Assoc. Prof Dr. Faridah Qamaruz Zaman from the Institute of Bioscience for the creation of the Agricultural Conservatory Park;

Assoc. Prof. Dr. Muhammad Nazrul Hakim Abdullah from the Sports Academy with his product called the "*Orthosiphon stamineus* (Misai Kucing) Herb as Diuretic Agent in Sports Medicine"; and finally to Dr. Ahmad Bustamam Abdul who represented the Institute of Bioscience with his product called "A Natural Compound from A Local Herbal Plant as a Potential Cure for Cervical Cancer".

A Training Hub for English Teachers

Assoc. Prof. Dr. Jayakaran Mukundan, the ICELT 2009 Chairman, delivering his opening speech during the ICELT 2009 held at Equatorial Hotel, Malacca.

An International Conference on English Language Teaching (ICELT 2009), a two-day event hosted by the Resource Centre, the Faculty of Educational Studies, Universiti Putra Malaysia, provided an avenue for 250 presenters and prominent speakers from over 20 countries for an intellectual discourse concerning the English Language and its teaching methodologies. According to the ICELT 2009 Chair, Assoc. Prof. Dr. Jayakaran Mukundan, the international conference is essential in gathering academicians from all over the world to exchange ideas and research breakthroughs in English language teaching-learning.

As the first university to offer the subject of Teaching English as a Second Language (TESL), the Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah, pointed out that there is a need for UPM to increase the number of foreign instructors who are English language experts. This is to facilitate the implementation of a more effective English language curriculum compared to other developing countries.

The event, which was held at Equatorial Hotel, Malacca, also witnessed the presentation of scholarships to three lucky recipients namely Irawaty Herlina Md. Solehan, 25, for the Tun Dr. Mahathir ELS-TESOL Internship Scheme, Abdullah Omar, 25, and Muhammad Uthman Omar, 20, both for the Tun Dr. Mahathir UPM-ELS Awards.

STEDex' 09 – A Positive Impact on the Malaysian Design Industry

The Sustainable Tropical Environmental Design Exhibition (STEDex' 09) has seen a positive impact on the design industry in Malaysia. The convention was held to display the work of art design and architecture produced by students and lecturers of UPM to foster the activity of R&D. 15 participants participated in the event with 11 products being exhibited.

Assoc. Prof. Dr. Osman Mohd. Tahir, the Dean of the Faculty of Architecture and Design (FRSB) with the Director General for the Department of Higher Education, Ministry of Higher Education, Prof. Dato' Dr. Ir. Radin Umar Radin Sohadi and UPM's Vice Chancellor, Prof. Datuk Nik Mustapha R. Abdullah.

The Director General for the Department of Higher Education, Ministry of Higher Education, Prof. Dato' Dr. Ir. Radin Umar Radin Sohadi, expressed his commitment and support to STEDex' during the opening ceremony of STEDex' 2009. Assoc. Prof. Dr. Osman Tahir, the Dean for the Faculty of Architecture and Design (FRSB), UPM, said that in their bid to accommodate the recognition of an indexed exhibition, they had reviewed UPM's membership with the International Council Museum (ICOM).

Currently, FRSB is working on an art design catalogue as well as creating Virtual Library Museum Pages (VLMP FRSB UPM) to be linked to the ICOM website. The gravity of the effort includes sending a representative to ICOM's headquarters in Paris to further discuss the possibilities. The Virtual Library Museum Pages (VLMP) was launched at the event by the Director General followed by the presentation of UPM's membership card in ICOM Malaysia to the Vice Chancellor of UPM, Y. Bhg. Prof. Datuk Dr. Nik Mustapha R. Abdullah by the President of ICOM Malaysia, Y. Bhg. Dato' Dr. Adi Hj. Taha.

STEDex' 2009 also discussed "Sustainable Environmental Design" by two invited speakers, Prof. Chris Rust, the Director for the Sheffield Institute of Arts, Sheffield Hallam University, United Kingdom and Prof. Dr. Richard Hyde, Head of the Architectural and Design Science Discipline, University of Sydney, Australia.

New Food Products by UPM

The Faculty of Science and Food Technology (FSTM), Universiti Putra Malaysia (UPM), in its quest to generate first class graduates, has outlined strategies to increase the number of lecturers and expertise, and improve the facilities and infrastructure. Recently, they successfully established a Supercritical Fluid Extraction Centre, a major collaboration with Biotech Corporation, during an exhibition on new food products.

Visitors were given a chance to taste some new food products by the Faculty of Science and Food Technology.

The highlights of the day went to "1 Gaga – Herbal Ice-Cream", an exclusive ice cream for the health-conscious, especially the vegetarians and those who are lactose intolerant. It was made from soy milk, oat, pennywort (pegaga) and soy husks.

The other nine products were "EbiC-Sup Bebola Daging" (meatball soup), "Cemp-Enak Bebola Pastri" (ball pastries), "Dip-em-Biskut dan Sos Pencicah" (cookies and dipping), "Veggie Bit-Konfeksi Gula" (confectionary), "SuriFresh-Makanan Ringan" (tit bits), "Yopai-Minuman Terfermentasi" (fermented drink), "Fiji-Makanan Ringan" (tit bits), "Pulse Delight-Makanan Ringan" (tit bits), and "Vit-A-Mi-Mi Segera" (instant noodles). The prizes for the best new food product were presented by Ng Bee Hee, a representative from Gulf Chemicals Sdn. Bhd.

Young Trees for the Young Generation

A group of UPM's community showing how much they care for the environment by planting trees.

University Putra Malaysia and Yokohama National University, Japan (YNU) established a partnership since 1990 through a tree planting project held initially at the UPM Bintulu Campus (UPMKB). The project was fully sponsored by the Mitsubishi Corporation, Japan with a RM 5 million grant as a kick-start fund. The model forest concept was introduced by Prof. Dr. Akira Miyawaki from YNU to be integrated with an accelerating natural vegetation concept introduced by Dato' Prof. Dr. Nik Muhamad Abd. Majid, the former Dean of UPMKB. The key objective of the project was to erect a model forest where the project had drawn 650 volunteers ranging from principal officers of UPM, local and international students along with government agencies. At present, a number of 350,000 young trees from 128 species have been planted in the 47-hectare land at the Bintulu campus since 1991.

A pioneer model forest in Serdang took shape after the success in UPMKB. The programme witnessed a massive planting of 5,800 young trees from 112 local forest species, including some endemic species collected from Peninsular Malaysia. The Malaysia – Japan collaboration project, aimed at forest conservation, involved 6.5 hectares of UPM land. The General Manager of CSR & Environmental Affairs Office, Mitsubishi Corporation Japan, Minoru Akita expressed his hope that the collaboration could benefit the younger generation and educate them on the importance of conserving our depleting forest. In 2008, at the same location, 27 hectares of tropical forest model was established with 3000 young trees from the main species being planted.

"The Tree Planting programme of UPM, in collaboration with the Mitsubishi Corporation, should be continued in the future as part of the effort to educate the younger generation," said the Deputy Vice Chancellor (Academic & International), Prof. Datin Paduka Dr. Aini Ideris.

4 Gold Medals for UPM in Germany

From left: Prof. Dr. Maznah Ismail, Assoc. Prof. Dr. Abdul Rashid Mohamed Shariff, Dr. Osumanu Haruna Ahmed and Assoc. Prof. Dr. Sabira Khatun after receiving their awards at IENA 2009.

Another proud moment for UPM when fellow researchers brought home 4 gold, 1 silver and 3 bronze medals from the International Exhibition of Ideas-Inventions-New Products (IENA) held recently in Germany.

The first gold went to Assoc. Prof. Dr. Sabira Khatun, who represented the Faculty of Engineering with the "PIC Multi-user Receiver for Multi Rate Combined CDMA and SDMA Systems with Increased Capacity". The invention has enhanced the capacity of wireless networks by combining CDMA and SDMA and the combination with PIC is proven to accept more users than other systems.

The second gold went to Assoc. Prof. Dr. Abdul Rashid Mohamed Shariff from the Faculty of Engineering with "Agricultural Land Suitability Evaluator" that is equipped with computerised innovation system by applying Geographical Information System (GIS) that enables consumers to determine the most suitable planting soil. Prof. Dr. Maznah Ismail, from the Institute of Bioscience, won the third gold through her product called "Thymoquinone Rice Fraction Prepared from *Nigella sativa* Seeds with Cardioprotective and Neuroprotective Properties", a supplement produced from *Nigella sativa* seeds to lessen the risks of cardiovascular disease, senility and colon cancer.

The fourth gold was won by Dr. Osumanu Haruna Ahmed from the Faculty of Agriculture and Food Science, UPM Bintulu Campus, Sarawak, for his "Simple Rapid and Cost Effective Technology for Producing Organic-based Fertiliser", a new technology to extract humic and fulvic acid from organic material that only takes 7 hours compared to the previous 2 to 3-day process. The International Exhibition of Ideas-Inventions-New Products (IENA) was held from 5 to 8 of November and showcased 800 research products from 33 countries.

UPM to Increase Awareness on Animal Welfare

Assoc. Prof. Dr. Bashir Ahmad Fateh Mohamed, the Dean of the Faculty of Veterinary Medicine, giving his speech at the International Conference on Animal Health and Human Safety.

Climate change, population growth and change in lifestyles are key elements to be considered in managing animal welfare and human dependency on them. In his keynote address, Dato' Dr. Abd. Aziz Jamaluddin, the Director of the Department of Veterinary Service, Malaysia, said that there is a need to improve our knowledge and services by sharing information with the regional countries thus, guiding us in protecting animal welfare for the safety of human beings.

"It is crucial to join forces with the countries that have proven modules since increased awareness would definitely assure the dependency of humans on animals especially in food resources, daily needs and recreation," he said in his keynote address entitled "Meeting the Challenges of Animal and Human Health Together In Malaysia" during the officiating ceremony of the International Conference on Animal Health and Human Safety. The event was held at the IOI Palm Garden, Putrajaya and co-organised by the Faculty of Veterinary Medicine, UPM and the Department of Veterinary Services Malaysia along with the Faculty of Veterinary Medicine, University of Airlangga, Indonesia.

In addition, the Vice Chancellor of UPM, Prof. Datuk Dr. Nik Mustapha R. Abdullah, reminded the participants of the mounting responsibilities for everyone, as any action taken would impact the lives of others. "This conference should be regarded as an effective channel to find a resolution in managing animal welfare and sustain the condition of human safety," he said further. He added, "The dependency of humans on animals is apparent in our daily lives. The emergence of diseases such as SARS and H1N1 have severely affected human lives due to poor animal health." The conference also included presentations from Indonesia, Thailand, Myanmar, Pakistan and Libya.

INNOVA Energy 2009

En. Wan Zuha, Dr. Siti Mazlina, Ir. Prof. Dr. Norman Mariun, Dr.-Ing. Ahmad Fauzi Abas, Dr. Mohd. Zainal Abidin and Assoc. Prof. Dr. Ratnasamy Muniandy

Five institutions of higher learning, private institutions and research institutes represented Malaysia at INNOVA ENERGY 2009 with a submission of more than 38 products out of a total of 400 from 30 countries. In the event held recently, Universiti Putra Malaysia snatched a Special Award, 4 golds and 1 silver medal.

The Special Award was awarded by the Belgian Ministry of Defence to Ir. Prof. Dr. Norman Mariun through his product called "Linear Displacement Sensor using the Meander Coil and Pattern Guide", a project with Dr. Norhisam Misron.

The second gold medal went to Dr. Siti Mazlina Mustapa Kamal with her "Fruits Grater and Peeler", a three-functional device that eases the hassle of grating, peeling and cutting of fruits.

Wan Zuha Wan Hassan walked away with the third gold for her product entitled "Software Tool – A Fault Syndrome Simulator for Functional Faults of Static Random Access Memories (RAM)", a software to find algorithms that could simultaneously detect error in RAM.

Dr. -Ing. Ahmad Fauzi Abas received the final gold with his invention "Duty Cycle Division Multiplexing Increasing the Optical Fibre Capacity Utilisation", a method to transmit high-speed data in cost-savvy communication via fibre optics.

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 problems to human. There are several pollutants which pose as threats to drinking water. They are categorised in six categories as follows:

- Microorganisms; • Disinfectants; • Disinfection Byproducts; • Inorganic Chemicals; • **Organic Chemicals**; and • Radionuclide's.

As mentioned above, these are potential pollutants to human drinking water worldwide. This guideline provides a short yet necessary information on these drinking water pollutants. In this volume, you will receive information focusing on Organic Chemicals:

Organic Chemicals

Contaminant	1MCLG	2MCL	Potential Health Effects from Ingestion of Water	Sources of Contaminants in Drinking Water
1,2-Dichloroethane	Zero	0.005	Increased risk of cancer	Discharge from industrial chemical factories
1,1-Dichloroethylene	0.007	0.007	Liver problems	Discharge from industrial chemical factories
CIS-1,2-Dichloroethylene	0.07	0.07	Liver problems	Discharge from industrial chemical factories
Trans-1,2-Dichloroethylene	0.1	0.1	Liver problems	Discharge from industrial chemical factories
Dichloromethane	Zero	0.005	Liver problems, increased risk of cancer	Discharge from drug and chemical factories
1,2-Dichloropropane	Zero	0.005	Increased risk of cancer	Discharge from industrial chemical factories
Di(2-ethylhexyl) adipate	0.4	0.4	Weight loss, liver problems, or possible reproductive difficulties	Discharge from chemical factories
Di(2-ethylhexyl) phthalate	Zero	0.006	Reproductive difficulties, liver problems, increased risk of cancer	Discharge from rubber and chemical factories
Dinosebne	0.007	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables
Dioxin (2,3,7,8-TCDD)	Zero	0.00000003	Reproductive difficulties, increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories
Diquat	0.02	0.02	Cataracts	Runoff from herbicide use
Endothall	0.1	0.1	Stomach and intestinal problems	Runoff from herbicide use
Endrin	0.002	0.002	Liver problems	Residue of banned insecticide
Epichlorohydrin	Zero	Very minimum level	Increased cancer risk, and over a long period of time, stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals

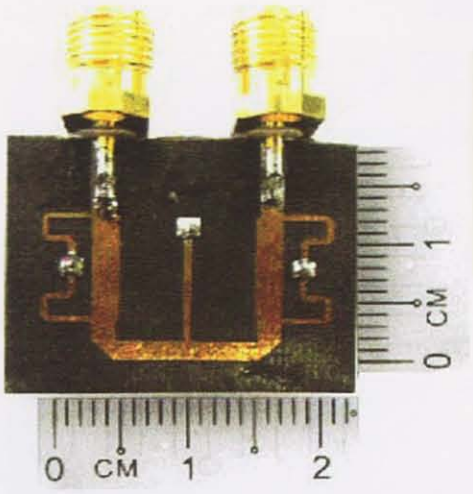
Definitions:

1. Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below in which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals. 2. Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.

*Units are in milligrammes per litre (mg/L) unless otherwise noted. Milligrammes per litre are equivalent to parts per million.

....to be continued in Synthesis Issue 28, March 2010.

A New UWB Filter for Higher Speed Communication



Ultra Wideband (UWB) technology has become a major interest to researchers since the technology promises ultra high speed communication. Unlike an ordinary radio transmission which uses carrier frequency, UWB is carrier-less with a wide spread spectrum. The implementation of the UWB technology originally came from the military radio to avoid detection by enemies. It is now legally open to non-military users around the world.

The Federal Communication and Commission (FCC) has offered a license band of UWB with rules that state bandwidth must be greater than 500 MHz and frequency ranges permitted from 3.1 GHz to 10.6 GHz with a low power transmission at -41 dBm. Several experiments, methods and techniques have been studied purposely to expand the bandwidth of bandpass filters in the past decade, employing methods from dielectric filled waveguides, resonators, coplanar waveguide, quarter-wavelength short-circuited stubs and/or open-circuited stubs, and hairpin. However, issues in designing compact size filter with low loss performance and which are cost-effective and easy to fabricate remain a challenge especially when involving a very wide bandwidth.

As one of the fundamental signal processing components in RF (radiofrequency) and microwave circuits, the filter plays a critical role in determining any system's ultimate performance. Since the electromagnetic spectrum has become more and more densely populated, filter performance has taken on greater significance than ever because interference rejection is of paramount importance. To the uninitiated, filters can be strikingly simple, since they are passive components that perform a single function: to reject RF energy either below or above a specific frequency or range of frequencies or both. However, the truth lies elsewhere, since there are not only requirements of multiple types of filters to fulfill but also multiple response types, material types, size constraints and suitable applications.

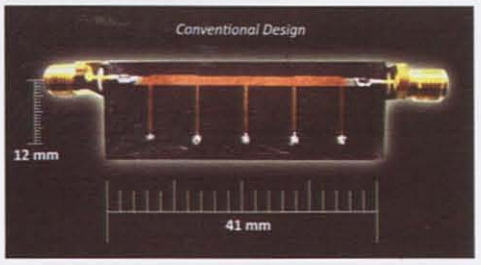


Figure 1: Original Model with Five Vias

BRONZE *International Exhibition of Ideas-Inventions-New Products (IENA 2008)*
BRONZE *Malaysian Technology Expo (MTE 2008)*
SILVER *UPM Invention, Research & Innovation Exhibition (PRPI 2007)*

Bandpass filter utilising short-circuited stubs (using via) has a great potential for bandwidth expansion. However, the filter, utilising short-circuited stubs, i.e. using via as a short-circuited element, has the potential of signal quality degradation due to parasitic effects that exist in its discontinuity parameters. This is where vias can turn into radiative, causing inductive loss and affecting the signal performance. To reduce the losses, quantity of vias must be reduced to maintain the optimum S-parameters performance as well as in achieving miniaturisation of the filter itself. After extensive researches, a "Butterfly" shape UWB filter manages to address these issues. A compact, low loss UWB microstrip filter has been designed consisting of "Butterfly" shape quarter-wavelength short-circuited stubs with less number of vias compared to conventional straight formation of quarter-wavelength short-circuited stubs filter. Figure 1 shows the original model which has five vias while Figure 2 shows the new designed pattern which only requires three vias shorted to the ground. The latter shows that stubs are bent so that they are able to share vias. The filter is realised by using standard photolithography process on R/T Duroid 5880 with relative permittivity 2.2 and 0.508 mm of substrate thickness. This new pattern delivers excellent S-parameters and group delay with a compact size of 21 mm x 14 mm, giving 30% size reduction. Therefore, a compact UMB filter with reduced inductive losses due to vias is designed which is suitable to be fitted in radar and high speed wireless radio communication systems.

Figure 2: Butterfly-shaped UMB Microstrip Filter

M. S. Razalli, A. Ismail, M. A. Mahdi and M. N. Hamidon, 2008. Ultra-wide Band Microwave Filter Utilising Quarter-wavelength Short-circuited Stubs. Microwave and Optical Technology Letters, 50, 11, 2981-2983.

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Reader Enquiry
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Bifidobacterium pseudocatenulatum G4: A Potential Probiotic for Gut Health

Probiotics are bacterial flora that dwell in the intestines, allowing the nutrients we ingest to be utilised by the body. This complete process requires a healthy gut. Modern diet, stress, and strenous workload all compromise the health of the gut, leading to sickness, gas, indigestion, and wasted nutrients - not to mention sickness.

A healthy gut environment could be achieved via maintenance of the dominant beneficial bacterial group over other intestinal microbiota communities. Beneficial *Bifidobacterium* species exist at high concentrations in intestines of breast-fed infants, therefore protecting the child against many pathogens. However, *Bifidobacterium pseudocatenulatum* is not largely explored as a probiotic. Interest in this species has prompted us to screen and identify *B. pseudocatenulatum* G4 isolated from infant faeces by RAPD and ERIC sequence-based PCR. However, safety studies on strains of *B. pseudocatenulatum* are limited and should be carefully assessed. As a new potential probiotic, strain G4 might not share the same safety status of commercially available strains, even though most *Bifidobacterium* strains are generally regarded as safe (GRAS) for dietary use.

To further enhance the efficiency of probiotics, different prebiotics were developed to selectively promote the growth of *Bifidobacterium* in the colon. Several ingredients, such as inulin, fructo-oligosacharide, sorbitol and arabinan, were successfully used as prebiotics to stimulate the growth and activities of beneficial bacteria in the colon, mainly bifidobacteria and lactobacilli. Recent developments in the use of functional ingredients to promote better health and well-being have initiated our laboratory to search for new prebiotics. One of the potential sources that has been currently reviewed is mushrooms. Mushrooms contain carbohydrates like chitin, hemicelluloses, β- and α-glucans, mannans, xylans and galactans that meet part of the prebiotic definition. The presence of probiotics and prebiotics in the same product is termed synbiotic. The approach has been reported to enhance efficiency through supporting viability and enhancing enzymatic activity of probiotics. Therefore, synbiotic concept gains the interest of many researchers. However, it is difficult to find fixed optimised growth formula for all probiotic strains due to their activity variances.

Studies in our laboratory had screened *Bifidobacterium pseudocatenulatum* G4 for its probiotic potentials. The strain was found to survive the harsh gut environment. Feeding strain G4 at dose level equivalent to several times higher than the lethal dose reported for lactic acid bacteria to BALB/c mice did not affect their health nor reveal any infectivity or pathogenicity symptoms. The results of clinical biochemistry (hematology and blood biochemistry parameters) did not reveal abnormal clinical signs at the end of the feeding trials. The synergistic compatibility of the strain G4 with prebiotics was also evaluated. A statistically developed model for optimisation found that the combination of 2.86% fructooligosaccharides (FOS) (w/v) and 0.67% inoculum size (v/v) produced the optimum growth of strain G4 in skim milk medium.

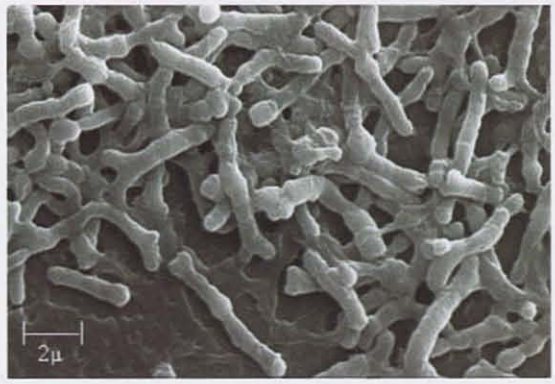

Figure 1: The scanned electron micrograph of *B. pseudocatenulatum* G4 (magnification 5000 X).

Thus, this article summarises the safety and synbiotic properties of *B. pseudocatenulatum* G4 (Figure 1) as a potential probiotic. The general health of BALB/c mice was not affected by feeding them with a high dose of B. *pseudocatenulatum* G4 in four weeks of acute toxicity assessment. At the end of the experimental period, there was no evidence of infectivity, pathogenicity or toxicity risks. The strain G4 was found to grow well in skim milk medium supplemented with FOS. These findings further substantiate the potential of *B. pseudocatenulatum* G4 and FOS as synbiotic.

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Reader Enquiry
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FROM BIOWASTES TO RENEWABLE ENERGY FUEL

Biochar is produced from many biowastes such as crop residues, food waste, and sewage sludge. In Malaysia, the most abundant biowaste with market potential for biochar production is the oil palm empty fruit bunch (EFB). Biochar can be used as renewable energy fuel, carbon sequestration and for mitigating climate change.

UPM, in collaboration with Nasmech Technology Sdn. Bhd., has successfully set up a pilot plant to produce EFB biochar and it would be in full operation by the end of this year. This project is fully supported by a grant (Technofund) from the Ministry of Science, Technology and Innovation.

A workshop was held recently to create interest among stakeholders in biochar R&D, specifically in EFB biochar. The event was aimed to promote the innovation of green technology in the handling of material waste through methods of reducing, recycling and energy conservation.

The event also covered issues in mass biochar production, carbon sequestration in soil and climate change. The objectives of the workshop were to increase awareness of stakeholders on the importance of biochar in climate change and carbon sequestration, explore and update the R&D, production and application, and discuss the future direction of EFB biochar. Another objective was to share the state-of-the-art Carbonator™ technology in EFB biochar production.

The workshop, which was organised by Universiti Putra Malaysia (UPM) in joint collaboration with Nasmech Technology Sdn. Bhd., was officiated by the Deputy Minister from the Ministry of Science, Technology and Innovation (MOSTI), Y. Berhormat Tuan Haji Fadilah Yusof, at the Mines Wellness Hotel in Seri Kembangan on 14 December 2009.

The Deputy Minister said the steps taken by these organisations signified the first move in preventing the recent global climate change that had made headlines around the world.

Dr. Johannes Lehmann, the Chairman of International Biochar Initiative (IBI) and an Associate Professor of New York's Cornell University, also participated in the workshop as a keynote speaker and guided Biochar Malaysia in fulfilling its objective in mitigating climate change and carbon sequestration. IBI is firm in supporting biochar production and utilisation of systems that reduce net greenhouse (GHG) emissions, improve soils and do not contribute to deleterious land use.

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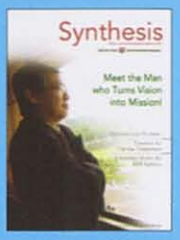

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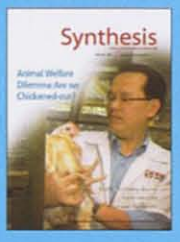

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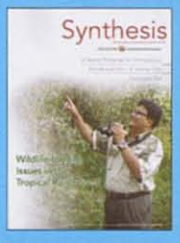

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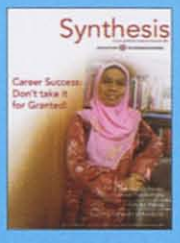

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