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## Real Goal of University Education— formation of personalities



Nobel Laureate Professor Richard Ernst, Professor in Chemistry with Professor Muhammad Awang & Dr. Zulkifli Idris on his left, and Datoq Dr Salleh Mohd. Nor & Tan Sri Datoq Dr. Augustine Ong on his right at UPM

The high-profile public lecture hosted by Nobel Laureate Professor Richard Ernst addressed the long-term responsibility of universities, which goes much beyond our common understanding of academic obligations, restricted to teaching and research. Professor Richard did not intend to give specific answers to the great overarching questions of a global future but instead appealed to the academic community for discussing, more than in the past and at all conceivable occasions, questions that relate to society and its future, hoping for stimulating a lively discussion culture at universities. His main goal is merely to raise the alertness for societal questions in the academic community.


progress and for protecting the interests of future generations? Even we rational researchers are human beings with ethical principles and with compassion towards the less favoured members of society. Only when we act as full personalities, taking serious also our emotions and our anxieties, our hope and our despair, we will be able to make valuable cultural contributions with a lasting effect.



"...education costs money and so does ignorance"

The appeal to accept more societal responsibility is compatible with the future-oriented scientific endeavours. When we set out, by our research activities in the laboratory, to incrementally influence the course of history, we are also requested to contemplate upon the desired long-term global development. Who else, if not the scientists, is responsible to set guidelines for defining

"The appeal to researchers and teachers to widen their scope beyond their fascinating specialities is very near to my heart", he added. He is convinced that academics have to search actively for valid answers to the great existential questions of their time. Nobody else, for practical reasons, is in a better position to provide long-term guidance into

a beneficial future for the entire globe. In conclusion, we perhaps take to heart the two brief sentences which Karl Popper expressed on December 17, 1993, in Berlin (1): "Optimism is our duty. We all are co-responsible for what is coming." 



## Copper-Coated Urea for Rice Production

Y.M. Khanif, K.L. Tai and M. Zainal Anuar



Award Winner

Urea is an important fertilizer-N source used in rice production in the world today. However the efficiency of urea is low because it is easily hydrolyzed and lost through ammonia volatilization. Reducing urea solubility and the rate of hydrolysis can increase urea efficiency.

Slow release urea fertilizers can minimize the loss. Recent field investigations showed that there are Cu deficiencies occurring in many sites in the rice growing area in the Muda Irrigation Scheme, Kedah.

Continued on page 3





# UPM Digital Moisture Meter

Zulkifly Abbas, Kaida Khalid, Jumiah Hassan, Sidek Abdul Aziz, Abd. Halim Shaari, Lee Kim Yee and You Kok Yeow


This Digital Moisture Meter developed at UPM is a multipurpose meter designed to measure moisture content of soils, foods and agricultural products. The moisture meter is essentially a PC-controlled measurement system consisting of specially designed microwave sensors and components for use in the frequency range between 0.5 GHz and 12 GHz.

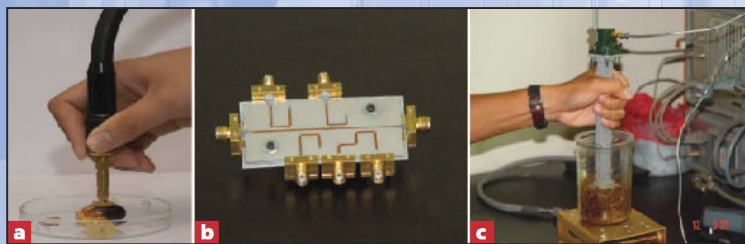


Run-time version of UPM Digital Moisture Meter Software

Several microwave sensors have been developed specially for use with the moisture meter. A waveguide system can be used to monitor soil

moisture available to plants continuously, quickly and easily.

This system eliminates guesswork so that irrigation can be effectively scheduled according to plants' requirements. Continuous and appropriate use of a soil moisture meter can effectively aid in obtaining maximum crop yield at optimum quality levels and conserve water. The waveguide system has also been successfully used to determine moisture content in oil palm fruits. For single fruit measurement, an open ended coaxial sensor can be used to predict the amount of moisture content. All the sensors developed for use with the UPM Moisture Meter provides moisture measurement accuracy within 5% when compared to standard oven drying method. 



Microwave Sensors and Components of the UPM Digital Moisture Meter (a) single fruit measurement (b) batch sample of fruits (c) microwave coupler

## Reader Enquiry

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# Painting Robot

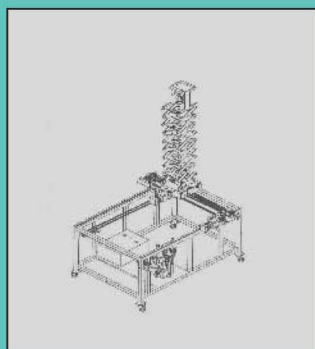


## for Houses and Buildings

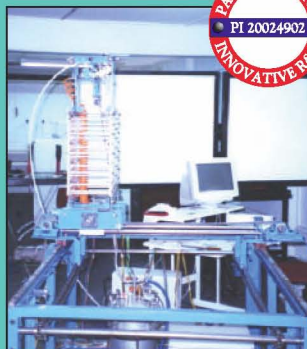
Ishak Bin Aris and A. K. M. Parvez Iqbal

Nowadays robots are widely used in many applications such as in factories, the mining industries, the automobile industry etc. Currently, the application of robot is still not widely implemented in construction industry. In construction industry, robots are designed to increase speed and improve the accuracy of construction field operations. It can also be used to do hazardous and dangerous jobs in construction. For example, house painting is done manually. This process can be simplified using a special dedicated robot. It is very difficult and troublesome for human to work in an upright position especially for painting, cleaning and screwing in the ceiling for a long time. Painting in an upright position is also very dangerous for the eyes. To overcome this difficulty, a painter robot system has been developed at UPM.

The painter robot comprising a vertically extendable frame structure adapted to receive an end effector



3D Schematic diagram of the painting robot




Robot capable of painting houses & buildings automatically

operational tool such as spray gun mounted onto a support frame assembly. The vertically extendable frame structure can move to and fro along a longitudinal X-axis of the support frame assembly. It can also move to and fro along a longitudinal Y-axis on the support frame assembly. An electronic processor control is used to receive and process electronic signals of the position of the end effector operational tool and other components of the painter robot to activate the movements of the extendable frame structure to a desired spatial position as well as the painting.



This robot can improve painting quality, reduce labour and operation costs and reduce accident rates. It needs less maintenance and it is easy to operate.

It is patent-pending under Malaysian Patent registration number PI 20024902. 

- GOLD** – Industrial Equipment category, Invention & New Product Exposition (INPEX 2004).
- BRONZE** – Science category, Invention & New Product Exposition (INPEX 2004).
- BRONZE** – International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2004).

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Award Winner





# Palm Oil Based Fatty Acid Impregnated in Gypsum Wallboard



Chuah Teong Guan, Salmiah A., Rozanna D., Medyan R., Thomas Choong S.Y., Sa'ari M.

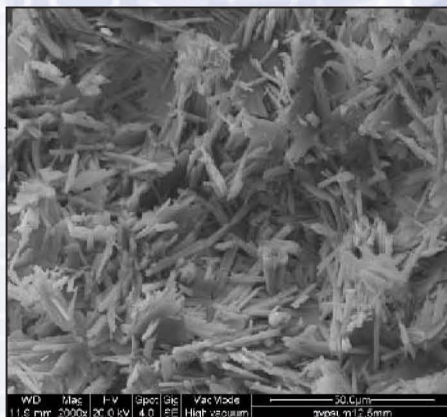
Award Winner

Rapid development in Science & Technology has led to huge demand on energy. In an attempt to conserve energy and reduce dependency on fossil fuels, and also to reduce the greenhouse gas emission, it is essential to seek effective means of reducing peaks in power consumption and to shift portions of the load from periods of maximum demand. Storage of thermal energy, hence, becomes an important aspect in engineering application, especially in energy conservation in buildings. For example, heat collected during periods of bright sunshine can be stored, preserved and later released for utilisation during the night in solar energy systems. Heat storage can also be applied in buildings where heating needs are significant and electricity rates allow heat storage to be competitive with other forms of heating.

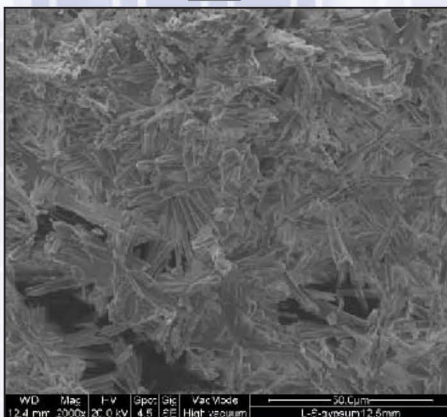
The search for suitable heat storage materials has recently been directed towards the use of low melting organic materials in an effort to avoid some of the problems inherent in inorganic phase change materials, for example supercooling and segregation. Palm oil based fatty acids are one of the organic phase change materials. They possess some superior properties over other materials such as melting congruency, good chemical stability, non-toxicity and suitable melting temperature range for solar passive heating applications.

These materials, in their liquid phase, have a surface tension in the order of 20-30 dyne/cm that is high enough to be retained in the structure of the host material. They also possess elevated latent heat of transition and high specific heat (in the range 1.9-2.1 J/g°C) and exhibits only small volume changes during melting or solidification (example: melting dilatation is around 0.1-0.2 ml/g). In addition, little or no supercooling occurs during the phase transition with these materials, which is an important advantage over many other materials. Because of the protected carboxyl group, fatty acid base materials are chemically, heat and colour stable, low corrosion activity and non-toxic. The raw materials of fatty acids are derived from renewable vegetable and animal sources. This assures a continuing non-pollutant source of supply.

Eutectic mixtures of fatty acids as phase change material (PCM) is impregnated in gypsum wall. Lauric – stearic acids eutectic mixtures have suitable melting point for passive solar building heating and cooling applications. Passive solar building heating and cooling



SEM Picture of Gypsum before Impregnated with Fatty acid



SEM Picture of Gypsum after Impregnated with Fatty acid

can be done by 3 methods, which are simple immersion, direct incorporation and encapsulation. This study deals with simple immersion of gypsum wallboard for 1 hour in lauric – stearic acids eutectic mixtures with composition of 75.5: 24.5 weight %. Lauric – stearic acids eutectic mixtures have melting point of 34.147°C and latent heat of 171.061kJ/kg. After immersion, thermal characteristics of gypsum wallboard are

observed. The Differential Scanning Calorimetric (DSC) analysis results showed that for PCM – gypsum 12.5 mm thickness, melting point and latent heat are 34.069°C and 55.963kJ/kg. Meanwhile for 6 mm thickness are 34.322°C and 46.601kJ/kg.

The fatty acids impregnated wallboard possesses sharp heat release characteristic at the desired room temperature. It has demonstrated as a potential energy saving in building and construction material.



Immersion Process of Gypsum Board with Fatty Acids

**BRONZE** – International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2004).

## Reader Enquiry

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# Intelligent Asphalt Mix Tester (Turamesin)

Ratnasamy Muniandy, Salihudin Hassim, Husaini Omar and Radin Umar

Testing of asphalt materials is an expensive business. On an average approximately RM 3 million is invested in equipments that are necessary to determine the properties of asphalt mixtures.

The new cost effective equipment developed at UPM however is capable of measuring several properties such as stability, density, resilient modulus, and creep compliance of asphalt and soil mixtures automatically as they are roller compacted. The mix properties are automatically captured via pressure sensors and thermocouples embedded in the deck and analyzed with built-in software.

This new device is expected to be relatively inexpensive. A new Malaysian standard can be developed to determine the density and other asphalt mixture parameters using this piece of newly invented equipment.



TURAMESIN

The equipment is patent-pending under Malaysian Patent registration number PI 20031422, and has a great potential for commercialisation.



Award Winner

**SILVER** – Manufacturing category, Invention & New Product Exposition (INPEX 2004).

**AWARD OF EXCELLENCE** – INPEX 2004.

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Continued from page 1

Copper is needed in small amount and conventional methods of fertilizer application is not feasible. Thus, in this study Cu-coated urea, coating urea granule with palm stearin treated with CuSO<sub>4</sub>. The fertilizer developed is known as Urea-Ku. It has a slow release property and at the same time is able to supply Cu. Our studies at UPM showed that application of 120 Kg N ha<sup>-1</sup> from the Cu-coated urea fertilizer to rice both in glasshouse and field experiments had significantly increased rice yield, N and Cu uptake as compared to conventional method.

The laboratory studies indicated that N loss was significantly reduced and the N released was also delayed. It can therefore be concluded that



Cu-coated urea

Urea-Ku developed in this study is environment friendly and can increase rice yield by supplying Cu, and reduces N loss. 

**SILVER** – Invention and Research Exhibition Award 2002 (PRP 2002).

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# Production of Gelatin from Red Tilapia Skins



Jamilah Bakar, Harvinder Kaur, Russly Abd. Rahman, and Badlishah Sham Baharin

Award Winner

Gelatin is one of the most versatile and utilized gelling agents in food application due to its special texture, thermo-reversibility and the 'melt-in-mouth' perception. Its application as an ingredient in frozen foods manufacturing such as ice creams and pie-fillings are highly sought after since its functional properties are highly stable at low temperatures (e.g. at -30°C) and the properties are maintained even when the product is brought up to an elevated temperature. Its unique functional properties as stabilizers, emulsifiers, thickeners, flavor carriers and as an aid in juice clarification process normally surpass those of other natural and synthetic biopolymers. In addition to foodstuffs, gelatin has found a variety of applications in the pharmaceutical and photographic industry. The type of application is dependent on the grade of the gelatin which in turn is dependent on the processes involved in the production of the gelatin itself.

Gelatin is traditionally produced from bones and skins or hides of mammalian origin such as bovine and porcine by acid or alkaline treatment to give type A and type B gelatins, respectively. However, due to the needs arising from religious issues for the Jewish, Hindus and the Muslims, studies conducted at UPM have brought about the need to produce gelatin from non-traditional sources.



Gelatin powder


Gelatin from marine sources (fish skin, bones, fins and scales) has been looked upon as possible alternatives besides fulfilling the need of zero waste concepts in the manufacturing industries. Fish skins, bones and scales are the by-products of fish processing industry. The ongoing research has also proven that the skins of cultured freshwater fish such as red tilapia are promising alternative sources of commercial gelatin. There are two main issues to be addressed in the production of gelatin from red tilapia skins. First, the process cannot be directly adapted from the mammalian derived gelatin due to the different chemistry of the skins and bones; secondly, the character of the tropical fish skin and bones have not been reported.

Modified and improved procedures for the extraction of gelatin using both organic acid and alkaline washing treatments have been accomplished in our laboratory.

The research conducted at UPM reveals that the gelatin exhibited excellent snowy-white color and barely detectable fishy odour. Physical properties such as gel strength, viscosity and



Applications of gelatin in food industry

melting point of tilapia skin gelatin are compatible to those of mammalian gelatin commercially available. The proximate and amino acid composition have also been looked into. Based on these properties, it is deemed that gelatin from tilapia skin has competitive market potential offering food manufacturers wider selection and application of the protein. 

**BRONZE** – International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2004).

**GOLD** – Science & Technology Expo 2003.  
**GOLD** – Invention and Research Exhibition Award 2003 (PRP 2003).

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## Re-inventing our future....

The vision of moulding UPM into a world-class institution is our key agenda as is outlined in our 10-year strategic plan spanning from 2001 to 2010. The plan is intended to transform the university into a world-class organisation, especially in terms of education, and research and development (R&D)—to produce quality graduates, and to upgrade it into a renowned centre of learning, agricultural and bio-resource services both nationally and internationally.

UPM pressed ahead tremendously with research achievements and awards particularly during the last two years. It made great strides in the international arena. This year's award winning research projects took a leap forward as accomplished participants raise the level of competition to a higher plane. All of our 10 contestants who participated in the recently held International Exhibition of Inventions New Techniques and Products in Genova from 31st March to 4th April 2004 brought home medals each in different categories (2 Gold, 6 Silver & 2 Bronze).

The I-TEX 2004 – International Invention, Innovation and Technology Exhibition and Competition 2004 added another feather on to the UPM's hat when all 8 of its scientists who exhibited various technology-driven products at the 3-days event held from May 20-22 at the Mid Valley Exhibition Hall, Kuala Lumpur were conferred 8 medals in different categories of Gold, Silver and Bronze.


It was yet once again a proud moment for UPM when 4 of its scientists from the Engineering faculty won 8 awards at the INPEX 2004—Invention and New Product Exposition held in Pittsburgh, USA from 12-15 May 2004.

A total of about 338 awards and prizes in different categories won by UPM's scientists between 2003 and 2004.

The year 2004 also saw the emergence of various research outputs. For example, research products to be patented soared from 65 in 2003 to about 107 in 2004 indicative of further enhancing the position of UPM as a centre of R&D in line with its 6 outlined objectives; to enhance excellence in research and take research effort to new heights. Our research partnership through commercialization and patenting will bring together our common aspirations, distinctive talents, and ceaseless quest for excellence.

Besides promoting research, UPM has emphasized the importance of publishing research findings in international journals. It is through such publications, that UPM's excellence in research is globalised. It is noteworthy that between 2003-2004, UPM's scientists have published over 2,976 papers with 30% in refereed journals, about 56 of which are in international journals with high citation indices. Most publications in the foreign journals listed above are in "flagship journals" of international repute, particularly from the USA, United Kingdom, and Australia.

To reach out to the international community and boost intellectual discourse in the country, the Academy of Sciences Malaysia (ASM) organised several public lectures in various parts of the country. These high-profile lectures are being hosted by various world-famous Nobel Laureates that included Nobel Laureate in Chemistry, Professor Richard Ernst who hosted a public lecture "Science and Our Future" at UPM on 20 July 2004. This is the second of its series being held at UPM. Nobel Laureate Professor Ahmad H. Zewail from California Institute of Technology (CALTECH) hosted the first one at UPM in October 2002.

UPM as the venue of a number of these high-profile forums and public lectures clearly demonstrates that it is the place where the latest in cutting-edge knowledge is happening. I hope such activities will create an impact and some enthusiasm amongst the academia that will pave a path towards the birth of the first Malaysian Nobel Laureate! 

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## Science Citation Index— Research Status of a University

The *Science Citation Index* (SCI®) provides access to current and retrospective bibliographic information, author abstracts, and cited references found in 3,700 of the world's leading scholarly science and technical journals covering more than 100 disciplines. The *Science Citation Index Expanded* format, available through the *Web of Science*® and the online version, *SciSearch*®, covers more than 5,800 journals.

The *Science Citation Index* (SCI) is published by the Institute of Scientific Information (ISI), which was founded by Dr. Eugene Garfield in 1958. It was first published in 1964 and indexes journal literature for all topics in science, medicine and technology. The ISI also publishes similar indexes for the social sciences, the arts and the humanities. The World Wide Web version of the *Science Citation Index*, called *Web of Science*, has most of the features of the print version but is much easier to use due to its computerized format that encompasses the powerful "search" function as obviously, *Web of Science* is therefore more easily accessed than the print version of the *Science Citation Index*.

Unlike *Chemical Abstracts*, *Web of Science* is selective about the journals that it indexes. The *Science Citation Index* (and *Web of Science* along with it) does not attempt to cover all scientific publications. Instead, the print *Index* restricts itself to about 3600 journals, as well as some books and conference proceedings. Journals are selected by the *Index* based on their citation statistics - called their "impact factor."


The impact factor is calculated by dividing the number of times a journal's papers are cited by other articles to the number of papers the journal publishes. Only journals exceeding a certain impact factor are indexed. This cutoff varies with journal field. This approach indexes the most important journals, but can leave gaps, particularly in new areas of research.

The ISI's indexing process has become largely automated. This speeds up document processing but limits the depth of the index. Neither the print nor the online versions of the SCI have real subject indexing. Unlike some other indexes, the SCI does not group its entries by subject. *Web of Science* does allow one to search article abstracts for keywords, however. These features make the *Science Citation Index* less feasible for keyword/subject searching than a more specific, subject-oriented index.

Eugene Garfield, the creator of the *Science Citation Index*, took the concept of citation searching from legal literature and applied it to scientific publications through the SCI. This feature is what makes the SCI stand out from other indexes. For example, if one paper cites another, earlier paper in its bibliography, then it is likely that the two have some common subject matter. Citation indexing allows you to find the more recent paper by looking up the earlier paper as a search term. The citation chain of a paper can thus be traced forward in time - something that only a citation index can provide. This approach is intended to be complementary to classic subject searching. Very importantly, it avoids the limitations of subject terminology, which can vary from author to author and thus complicate a subject search. The number of times a paper has been cited by other researchers is generally a good indicator of its importance in the field. Of course, it takes time for a paper to be read and used in further research and thus develop a forward citation chain.

In nutshell, online indexes tend to have more fields and allow combining fields in a search. However, most online indexes are not linked to full-text articles, meaning you still need to go and get the papers you find. The chronological coverage of online indexes may be limited compared to the print editions. Online indexes can be searched via fields (e.g. author, journal title, etc.) or via subjects/keywords. Boolean logic is necessary to separate keywords in subject/keyword searching. *Web of Science* is one of the more popular Web-based indexes, and is unique in allowing forward citation searching.

There is no official link between the amount of mentions in the Citation Index and a university's research ranking or a researcher's standing, but it stands to reason that the more the researcher or institution is mentioned in the Citation Index the more important they are likely to be considered in their field. The number of times a paper has been cited by other researchers is generally a good indicator of its importance in the field. Of course, it takes time for a paper to be read and used in further research and thus develop a forward citation chain. Generally, as part of the rankings assessment, universities must submit 4 outputs of research from each researcher that they are including in their assessment, but whether that research has appeared in the Citation Index or not is not part of the formal assessment.

The Citation Index does not relate to the research status of a university directly. It relates to the fact that the index can show how often a paper has been cited by other researchers. So if you write a paper and over the next 5 years it is cited in 500 other papers on that subject, you can see that it has been a lot more influential than a paper by someone else on that subject which has only been cited in 100 other papers. So by using the index to see which institutions are generating the most citations, you get some relative measure of their success. 

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# Research Happenings

## Introductory Research Workshop for New Lecturers (27 July 2004)



Mr. Saibul Kasmi, keynote speaker from MOSTI with Dr. Nor Aripin Shamsari and Dr. Sidah Abd. Aziz at the launch of the workshop



From left: Mr. Jamsari, Dr. Nor Aripin and Mr. Zabidi Ali (MOSTI) at the workshop



COMING TOGETHER: The workshop organized by RMC attracted many new lecturers



WE MADE IT: the workshop secretaries

## Nobel Laureate's Visit to UPM—Professor Richard R. Ernst (20 July 2004)



World-famous Nobel Laureate Professor Richard R. Ernst shaking hands with Academician Tan Sri Datoh Dr. Augustine Ong at UPM



"...real goal of University education is the formation of personalities who will courageously address future challenges and do not succumb to the monetary temptations of our bluff society"



Professor Richard and his wife, Magdalena with high officials from UPM and ASM



FOR THE RECORD: from left are Professor Muhammad Awang, Professor Richard Ernst, Professor Mohd. Azmi Isha and Professor Zulkifli Shamsuddin



Deputy Vice Chancellor (Academic), Professor Muhammad Awang presenting a memento to NBL Professor Richard Ernst after his stimulating and inspiring lecture at UPM



SCIENCE AND OUR FUTURE—a thought expressed! Professor Mahbuz Marican with NBL Professor Richard

## Nobel Laureate: Exhibition of Research Excellence at UPM (20 July 2004)



NBL Professor Richard signing the visitor's book of autograph at the launch of the UPM exhibition of research excellence



Dr. Sidah and his team at the Research Management Centre booth



RMC Director, Dr. Shuhaimi exchanging words of wisdom with the Nobel Laureate



From left: Assoc. Prof. Dr. Mansor Ahmad, Prof. Abu Bakar Salleh, Prof. Mohd. Azmi and Assoc. Prof. Dr. Mohd. Shuhaimi



A signature from a NBL for motivation—spirit of enthusiasm!



From left: Dr. Maznah, Prof. Mahiran, Prof. Zulkifli and Assoc. Prof. Dr. Sidah

## Bukit Expo : Research Exhibition – Convocation Carnival (16-18 July 2004)



Exhibits from the Agriculture cluster—one of the largest established research institutions with agro-bio as its niche!



Inspiring & impressive research publications—hallmarks of RMC. Professor Muhammad Awang and Prof. Mahiran convinced!



From left: Assoc. Prof. Dr. Mohd. Hairi Bejo, Assoc. Prof. Dr. Shuhaimi and Professor Muhammad Awang



RMC Director Dr. Shuhaimi with Y.Bhg. Dr. Mohd. Nasir Mohd. Asraf, YKSU-II (Deputy Head Secretary), Ministry of Higher Education, Malaysia



Tim Sri Dato' Seri Dr. Zeinul Arifin IJ Husaini, Chairman, Board of Directors, UPM (centre), Y.Bhg. Dr. Mohd. Nasir Mohd. Asraf, YKSU-II (right), and Dr. Sidah (left)



En. Ahmad Tajuddin Zainuddin, Deputy Director, General Technology Transfer & Commercialization, MARDI with RMC Director, Dr. Shuhaimi



Dr. Zulkifli explains RMC's crucial role in R&D to Tuan Haji Kamalul Aripin Musa, Registrar, UPM



Innovation & Creativity: will drive education, research and scientific endeavors at UPM!

## Newmakers—building rapport (around the campus)



INTERNATIONALISATION: International partnerships saw greater growth in research collaborations—Vice Chancellor, Dato' Zohadie at the signing of the MoU at the Tokyo Agricultural University on 16 March this year



EXTERNAL LINKS: UPM as a global knowledge hub, a MoU signed between UPM and the Malaysian Film Development Association (FINAS) on 24 Feb 2004—Deputy Vice Chancellor (Academic), Professor Muhammad Awang and FINAS Director, Muhammad Nor Abu Shabid exchanging documents

## R&D Commercialization Luncheon (15 July 2004)



Welcoming Remarks by the Deputy Vice Chancellor (Academic), Professor Muhammad Awang at the R&D Commercialization Luncheon



Pn. Fatmiz (UBC) and Dr. Sidah (RMC) at the R&D Luncheon



From left: Professor Muhammad Ali Rajion, Professor Muhammad Awang and Dr. Malcolm Bush Pereira from Petronas Research & Scientific Services



From left: Dr. Sidah, Dr. Nor Aripin and Dr. Zulkifli—Deputy Directors, RMC

## I-TEX 2004—International Invention, Innovation and Technology Exhibition & Competition (KL) (20-22 May 2004)



ALL SMILES: Proud winners and recipients of Gold, Silver and Bronze medals at the I-TEX 2004 exhibition



Gold Medalist—Professor Mahiran Bazzi all smiles



Dr. Imad Hamad and Prof. Abd. Halim Shari—recipients of Bronze medals



Professor Norani Abu Samad receiving the silver medal from a representative from MINIX for her research on SpodK3™



Dr. Chuan Tiong Guan receiving a Bronze medal from the Head Judge, I-TEX awards



Dr. Ishak Aris received a Bronze medal for his research on a painting robot





## Bacteriocins of Lactic Acid Bacteria


Foo Hooi Ling, Lee Yock Ann, Lim Yin Sze, Loh Teck Chwen, Norihan Mohd. Saleh, Raha Abdul Rahim, Son Radu and Gulam Rusul Rahmat Ali

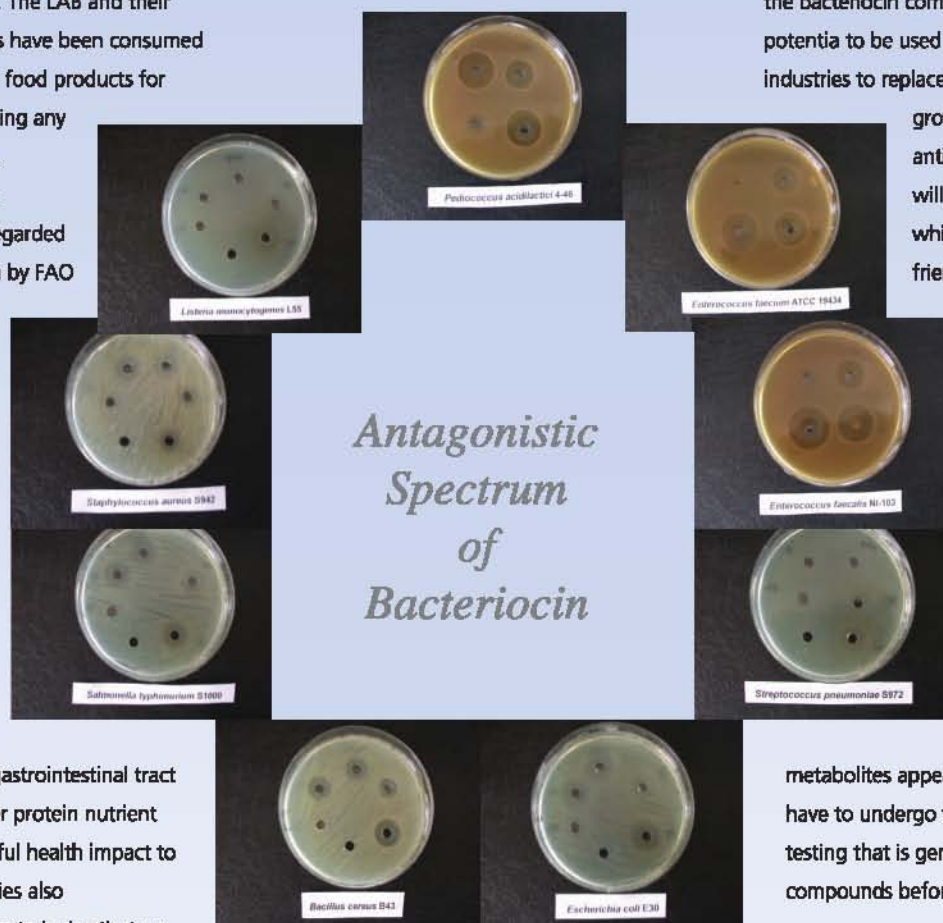
Award Winner

Lactic acid bacteria (LAB) have long been used in food preservation through fermentation process. LAB normally predominates the microbial flora of many oriental and western food products, which normally use dairy, meat and vegetable as raw materials. Certain LAB have the ability to produce bacteriocin—a proteinaceous antimicrobial compound. The LAB and their antimicrobial compounds have been consumed together with fermented food products for centuries without exhibiting any deleterious health effect, therefore LAB have been granted as "Generally Regarded As Safe (GRAS)\* bacteria by FAO and WHO.

Bacteriocin compounds that we discovered from locally isolated LAB are readily hydrolysed by proteolytic enzymes, such as trypsin,  $\alpha$ - and  $\beta$ -chymotrypsin, proteinase K and papain. Hence, they are easily hydrolysed in the gastrointestinal tract of consumers as for other protein nutrient without giving any harmful health impact to the consumers. Our studies also demonstrated that the bacteriocins that we obtained from locally isolated LAB have capability to inhibit many species of pathogens (broad inhibitory spectrum characteristics), for instance, *Bacillus cereus*, *Escherichia coli*, *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Salmonella typhimurium*, *Enterococcus faecalis*, *Enterococcus faecium* and *Listeria monocytogenes*. Besides that, the bacteriocin compound under study could also withstand high temperature up to 121°C for 15 min and below 15°C for 60 days and are also tolerable to broad pH range, between pH 2-5 (acidic pH) and pH 7-8 (basic pH). Based on the their versatile

characteristics, they possess vast potential to be used as natural and consumer friendly biopreservative in various food industries, such as minimally processed and refrigerated foods, heat-treated foods, alkaline and acidic food products.

preservatives worldwide. In addition, the LAB that is capable of producing bacteriocin also have vast potential to be a good candidate as well-defined starter culture for local fermented food industry and as probiotic species for human and livestock industries. Besides the application as biopreservatives in food industry, the bacteriocin compounds also have vast potential to be used as feed additives in livestock industries to replace the usage of antibiotics as growth promoter. The use of antibiotics as growth promoter will cause resistance in bacteria, which is not environmentally friendly. Based on the broad inhibitory spectrum of bacteriocins, they also exhibit vast potential in antiseptic cream and cosmetic formulation to solve skin problem. LAB that possess GRAS status will facilitate the commercialization of the bacteriocin and bacteriocin-producing LAB. LAB and their metabolites appear to be safe and may not have to undergo the stringent and extensive testing that is generally required for other new compounds before its commercialization. 



Most of the Malaysia food products are manufactured by Small Manufacturing Industries or domestically, hence, the quality is usually not consistent and easily perishable. Thus, chemical additives, such as sulphur dioxide, benzoic acid, sorbic acid, nitrate and nitrite are generally used to extend the shelf life of food products. These chemical additives may cause toxicity and have harmful health impact. Many food poisoning incidents due to food additives or pathogens have been reported every year, either locally or worldwide. Therefore there is an increasing interest in using bacteriocins as natural food

**GOLD** – Science & Technology Expo 2003.  
**GOLD** – Invention and Research Exhibition Award 2003 (PRP 2003).

### Reader Enquiry

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# Educational Software for Teaching Introductory Calculus at the University Level



Kamel Ariffin Mohd. Atan, Rustem Suncheleev, Ural Bekbaev and Ismail Abdullah

Award Winner

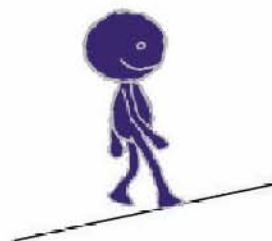
The last ten years have seen the widespread development of digital processing and communication coupled to networked computing. This has opened up a broad set of teaching and learning opportunities, allowing a new emphasis on interaction and concept exploration. As is commonly the case in other fields, however, these early extensions have tended to follow the already established distance learning conventions, or those of the classroom.

It's no mystery that our education system, especially in mathematics, is in dire need of improvement. Although today's online culture provides access to thousands of topics in a

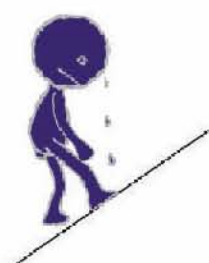
mathematical research. But it is only in recent years that remarkable improvements in computer technology have made it easy to externalize these vague and subjective pictures that we "see" in our heads, replacing them with precise and objective visualization that can be shared with others.

The product we have developed is fully animated **Introductory Calculus**. This is a textbook with CD which has a following features:

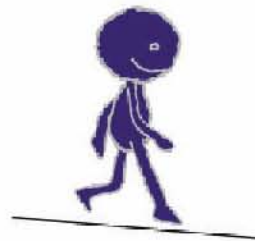
- The first fully animated course of Introductory Calculus
- Fast downloading and easy navigation
- Perfect match with Introductory Calculus syllabus



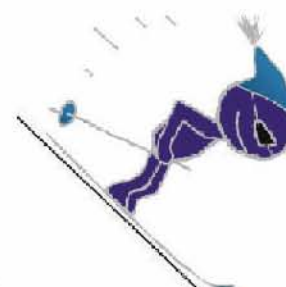
Small positive  
Slope



Big positive  
Slope




Small negative  
Slope



Big negative  
Slope

matter of seconds, the methods used to interact with and impart knowledge to the students are embarrassingly outdated. According to constructivism, school of thought, learning is a search for meaning. Each learner generates his own "mental models" to make sense of his experiences. In order to teach well we must not only understand the mental models that students use but also help them to develop the models.

Mathematicians have always used their "mind's eye" to visualize the abstract objects and processes that arise in all branches of

- Thoroughly developed animations that lead students through Calculus concepts
- Visual images that encourage students to analyze, interpret and predict information
- Focus on the whole concepts rather than on the isolated facts
- Animations illustrating processes as well as objects
- Animated real life problem applications
- Ideal for web based, class based as well as individual education 

**BRONZE** – International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2004).

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# MBSofax™



## New Green Palm-Based Fine Organics for Industry

Award Winner


Mahiran Basri, Erin Ryantin Gunawan, Abu Bakar Salleh, Mohd. Basyaruddin Abd. Rahman, Raja Noor Zaliha Abd. Rahman, Siti Salhah Othman, and Azmahani Sulaiman

MBSofax™ comprises an array of newly synthesized 'fine organics' originated from palm oil and its fractions. These kind of green chemicals for industry are often produced in low volumes but are highly priced with exceptional profit margins, favourably used in cosmetics, food, drugs, pharmaceuticals and other chemical industries.

This group of valuable products contain complex mixture of naturally occurring linear, long-chain, saturated and unsaturated structures to ensure accelerated adsorption into the skin with superb non-occlusive moisture control. They have been proven to be very stable with high oxidation resistancies as well as excellent shelf life. Lipsticks and moisturizing cream prepared using MBSofax™ possesses unique property of excellent wetting behaviour at interfaces with marvelous, comfortable, non-greasy feeling during application. Interestingly, soaps made from MBSofax™ are clean and white, melt slower, creates exceptional lather and offers enjoyable moisturizing properties. MBSofax™ is produced via a green synthesis using



Fine organics from Palm Oil and its fractions

enzyme with ratio of 3:1 of alcohol : oils of palm fractions at ambient temperatures. Characterization of the products indicated a moderate unsaturation of the fine organics with iodine values in the range of 35 to 55 while saponification number, implying the average molecular weight of the products were in the range of 100 – 109 to 133 – 135. MBSofax™ also offers great solubility in alcohol (0.38 – 0.79 g/mL) that makes them easily dissolved and emulsified. 



MBSofax™

**GOLD** – International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2004).

### Reader Enquiry

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# SpodKil™ for Your Pest Problem

Norani Abd. Samad, Ahmad Said Sajap, Lau Wei Hong and Husan Abd Kadir



Award Winner


The heavy use of chemical pesticides has already caused grave damage to health, ecosystems and ground water. Biopesticides, the use of microorganisms through inundative or inoculative release for biological control of insect pests have been proposed and implemented many years for promoting sustainable agriculture. They can reduce pesticide risks, in general, less harmful than chemicals, highly selective for a very narrow range of target pests, and often effective in small quantities. Biopesticides are expected to be a substantial component in pesticide usage in Malaysia in future.

SpodKil™ was developed in our laboratory based on a naturally isolated baculovirus, the *Nucleopolyhedrovirus* (NPV), which have the potential

to be used as biopesticide on a large scale for the control of *Spodoptera litura*, one of the serious pests of crucifers and other crops. SpodKil™ is produced in the form of concentrated wettable powder by cold grinding of freeze-dried viral substrate. Ultra violet protectants as well as surfactants are also added to the virus formulation to prevent inactivation by UV radiation and to provide a good residual activity on the target when used as spray after dilution with an inert carrier.

Field trial studies using SpodKil™ on *Brassica rapae* (sawi) showed significant control on *Spodoptera litura*. All SpodKil™ treated plots produced higher yield as compared with that of insecticide treated plot.

SpodKil™ alone treated plot produced 23% higher yield than insecticide treated plot.

SpodKil™ has the potential to be on a commercial scale as biopesticide that will provide a cleaner environment, ecofriendly and use for the production of organic vegetables with the usage of non-chemical method for controlling pests in the open and protected environment. It is ideal for the integration into the pest management system (IPM). 

**SILVER**— International Invention, Innovation, Industrial Design & Technology Exhibition (I-TEX 2004).

### Reader Enquiry

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Field Trials using SpodKil™ on *Brassica rapae* (choy sam)



# A Glance at Research Inventions & Innovations at UPM<sup>1</sup>

Continued from Issue 5, 2nd Quarter (Jun.2004)...

No.	Faculty/ Institute	Researcher	Innovation	Research Cluster	Project Number	Allocation
118.	Engineering	Mohd. Amin Mohd. Soom	Modeling paddy soil and water parameters for precision farming of rice	AFF	01-02-04-0070 EA001	RM145,000
119.	Engineering	Mohd. Halim Shah Ismail	Design and development of novel heat penetration technique for sterilization process in palm oil mills	SAE	09-02-04-0321 EA001	RM199,000
120.	Engineering	Mohd. Saleh Jaafar	Prediction of Durability Characteristic of Distressed Concrete Structures Through Mathematical Modeling using NDT Data	SAE	03-02-04-0152 EA001	RM171,600
121.	Engineering	Mohd. Sapuan Bin Salit @ Sinon	Concurrent engineering manufacturing system of polymeric based composite automotive pedal box	MEE	09-02-04-0323 EA001	RM99,080
122.	Engineering	Napsiah Ismail	Development of Intelligent Process Planning System for Tool and Die Industry	SAE	09-02-04-0825-EA001	RM173,900
123.	Engineering	Nasrullah Khan	Design of InGaN based blue semiconductor laser	SAE	09-02-04-0704-EA001	RM170,760
124.	Engineering	Nasrullah Khan	Design of an intelligent interface for mechanical relays	SAE	09-02-04-0625-EA001	RM157,500
125.	Engineering	Prithvi Raj Arora	Fretting fatigue characterization of 7075-T6, Ti-6Al-4V, and BS L65 aerospace aluminum alloys and its applications to aerospace industry	MEE	09-02-04-0446 EA001	RM175,000
126.	Engineering	Prithvi Raj Arora	Design, development and force analysis of six component external balance for aerospace wind tunnel applications	SAE	09-02-04-0635-EA001	RM161,500
127.	Engineering	Radin Umar Radin Sohadi	Design and Development of Motorcycle Barrier System	SAE	09-02-04-0830-EA001	RM158,200
128.	Engineering	Ratna Kalos Zakiah Sahbudin	Development and implementation of home using Bluetooth technology	ITM	04-02-04-0689-EA001	RM133,000
129.	Engineering	Robiah Yunus	Formulation of Natural Synthetic Lubricant for Hydraulic Fluids	SAE	09-02-04-0856-EA001	RM112,000
130.	Engineering	Rosely Ab. Malik	Development of Automated Rapid Soil Moisture Content Determination Equipment Using Pulse Infra Red Technology.	SAE	03-02-04-0412 EA001	RM198,100
131.	Engineering	Roslina Mohd. Sidek	Design of Floating-Gate MOSFET for Low Voltage Analog Integrated Circuits	SAE	09-02-04-0617-EA001	RM193,000
132.	Engineering	Sa'ari bin Mustapha	Development of a GIS Tool For Monitoring Risk Potential of Hazard Installations	SAE	09-02-04-0340 EA001	RM166,500
133.	Engineering	Sabira Khatun	Development Of A Software-Radio-Based Wireless Terminal Adapter For 3G/4G Systems	ITM	04-02-04-0186 EA001	RM248,000
134.	Engineering	Salihudin Hassim	Material Characterization for Road Construction in Malaysia	SAE	03-02-04-0413 EA001	RM187,000
135.	Engineering	Salim Said	Development of a decision support system and water management techniques for rice and maize	AFF	08-02-04-0251 EA001	RM85,000
136.	Engineering	Senan Mahmud Abdullah	Automatic Semiconductor Tap Changer for Power Transformers	SAE	09-02-04-0764-EA001	RM76,920
137.	Engineering	Shamsuddin Bin Sulaiman	Development and Analysis of Casting Product using Network Method of Flow and Solidification Process	SAE	03-02-04-0415 EA001	RM168,000
138.	Engineering	Shattri Mansor	Development of an Integrated Monitoring System for Natural and Environmental Disaster Management	MEE	09-02-04-0346 EA001	RM183,000
139.	Engineering	Sudhanshu S. Jamuar	Design and development of flickemeter and calibration test system	SAE	09-02-04-0761-EA001	RM238,000
140.	Engineering	Syed Javaid Iqbal	Design and Construction of Eye Safe Laser Range Finder/Speed Detector Using 1550 mm Fiber Laser	SAE	03-02-02-0522-EA001	RM146,500
141.	Engineering	Tan Ka Kheng	Theory and Simulations of Fluidized beds	SAE	09-02-04-0453 EA001	RM126,000
142.	Engineering	Tan Ka Kheng	Development of a Theory and enhancement of liquid-expanded columns for process industries	SAE	09-02-04-0708-EA001	RM174,000
143.	Engineering	Tang Sai Hong	Characterization, Optimization and Simplification of Computer-Controlled Robotic Systems	SAE	09-02-04-0545 EA001	RM142,500
144.	Engineering	Tey Beng Ti	Apoptosis (Programmed Cell Death) In Animal Cell Cultures Used for the Production of Biopharmaceuticals.	AFF	09-02-04-0454 EA001	RM201,000
145.	Engineering	Tey Beng Ti	Production and purification of recombinant Hepatitis B virus nucleocapsid	BAB	09-02-04-0766-EA001	RM199,000
146.	Engineering	Thamer Ahmed Mohammed	Development of Bio-composite interlocking block system for river revetment	SAE	09-02-04-0767-EA001	RM157,000
147.	Engineering	Thomas Choong Shean Yaw	Development of a comprehensive software for the design of pressure swing adsorption processes for chemical and process industries	SAE	09-02-04-0359 EA001	RM86,000
148.	Engineering	Thomas Choong Shean Yaw	Convergence acceleration for the calculation of cyclic steady state for the design of pressure swing adsorption for chemical and process industries	SAE	09-02-04-0622-EA001	RM199,600
149.	Engineering	Waleed Abdul Malik Thanoon	The Development of Ferrocement Brick Composite Floor Panel for Low Cost Housing	SAE	03-02-04-0417 EA001	RM185,600
150.	Engineering	Wan Ishak bin Wan Ismail	Design and development of on-line computer control bio-production robot for smart farming	MEE	09-02-04-0364 EA001	RM125,000

<sup>1</sup> Data presented IRPA RM-8 (as at Cycle 1, 2004); Total 416 EAR Grants, sorted by PTJ & name.

to be continued..

<sup>†</sup>The description of the some of the above Inventions and Innovative research products available for commercialisation at UPM are contained in the book—"R&D at UPM: Creating New Frontiers of Innovative Research", First Edition, Editor: Nayan Deep S. Kanwal, Published by Research Management Centre (RMC), UPM, available from Publications & Promotion Unit, Administration Building, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia, Tel: +603 8946 6028, 8946 6192, Fax: +603 8942 6539, e-mail: rschinfo@admin.upm.edu.my



# Synthesis Reportage

## Introductory Research Workshop for New Lecturers

Research Management Center (RMC) organized a one-day Introductory Research Workshop for New Lecturers entitled "Bengkel Pengenalan Penyelidikan" at Palm Garden Hotel, IOI Resort, Putrajaya on 27th July 2004. The main objective of the workshop was to introduce Research Management Centre and the functions of each of its 3 units to the new researchers at UPM, to familiarize them with various sources and research grants available nationally and internationally, and also to increase awareness amongst them with emphasis on the importance of multidisciplinary research at UPM.

About 80 enthusiastic participants attended this workshop comprising young lecturers with less than 5 years lecturership at UPM, along with tutors and science officers. Mr. Sakib Kusmi, Deputy Director of Science and Technology Division, Ministry of Science, Technology and Innovation (MOSTI) in his keynote address spoke on research policies and R&D in general. Other speakers included deputy directors from RMC.

In conclusion, the workshop successfully aroused interest in the young lecturers inculcating the research culture prevalent at UPM.

## R&D Commercialization Luncheon

The third R&D Commercialization Luncheon organized by Research Management Centre (RMC) was held at Palm Garden Hotel, Putrajaya, on 15th July 2004. The event was officiated by Professor Muhammad Awang, Deputy Vice Chancellor (Academic), UPM.

Dr. Malcolm Basil Pereira, Mr. Hassan Salleh, Mr. Ismail Yusof and Mr. Wan Uzir Shah Wan Shamsudin from PETRONAS Research and Scientific Services Sdn. Bhd. were the guests from the industry sector.

The function was also attended by Dr. Robiah Yunus from the Faculty of Engineering who presented her research findings on "High performance biodegradable synthetic lubricants from palm oil", Assoc. Prof. Ir. Dr. Azmi Yahya (Deputy Dean of Research, Faculty of Engineering), Assoc. Prof. Dr. Fakhrul Razi-Ahmadun (co-researcher), Prof. Dr. Mohamed Ali Rajion (Director, Public and International Relations) and Mrs. Fairuz Bawazeer Muchtar (Administrative Officer, UBC).

Also in attendance at the event were Director, RMC, Assoc. Prof. Dr. Mohd Shahwahid along with his three deputy directors, Assoc. Prof. Dr. Zulkifli Idrus (Policy, Planning and Finance Unit), Assoc. Prof. Dr. Sidek Abd. Aziz (Publication and Promotion Unit) and Assoc. Prof. Dr. Nor Aripin Shamsan (Research Grant Unit).

## FACT FILE

For the record



1 Ms. Nur Nasimi bt. Abdul Latif, Publication & Promotion Unit, RMC

1 Ms. Nur Nasimi has joined Research Management Centre as a Research Officer to assist the Publication Division of the Publication & Promotion Unit with effect from 1st July 2004. She replaces Ms. Siti Nurulhuda who left RMC on 30th June 2004 to explore the outside world.

Having worked in the private and public sectors on issues pertaining to human resources and R&D, Nasimi states she is ambitious, a quick learner and able to work under pressure in a fairly organized environment. She adds, she is well adapted in research and administration skills and is keen in acquiring proficiency in the field of publishing.

Nasimi holds a Bachelors degree in Applied Science from Universiti Sains Malaysia.



2 Mr. Asrizam bin Esam, Publication & Promotion Unit, RMC

2 Mr. Asrizam Esam has been transferred from the Research Grant Unit to the Publication and Promotion Unit of the Research Management Centre effective 1 July 2004 to boost and strengthen the organization of exhibitions, and promote R&D through publication material.

Asrizam holds a Bachelors degree in Computer Science to his creditability from Universiti Putra Malaysia.



SEMINAR ON e-LEARNING: UPM delegates with Dato Dr. Shafiq Salih, the Minister of Higher Education (centre) at the seminar held at Evergreen Hotel, Putrajaya from 13-14 July 2004

## Check it out

R&D at UPM: Part 2- Research Snapshots, published by Research Management Centre (RMC), UPM. Editors: Nayan Deep Singh Karwal, Mohd. Shahwahid Hj. Othman and Sidek Hj. Ab. Aziz, ISSN 1675-1248 is now available at RMC for distribution and sale.

## Letters to the Editor

If you have any comments about the content of the publication or any contributions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, Synthesis, Publication and Promotion Unit, Research Management Centre, 3rd Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to [editor@rmc.upm.edu.my](mailto:editor@rmc.upm.edu.my). The editor reserves the right to edit articles for clarity and space before publication.

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Are you reading your own copy of the UPM R&D Digest?

Synthesis is the first and only quarterly R&D digest of Universiti Putra Malaysia published in March, June, September and December with the focus on award-winning innovations. It covers research happenings emerging from the various faculties and institutes across the university and provides a brief summary of some of the important research findings of the study conducted at UPM. It brilliantly features special topics that are of national interest in various fields and disciplines.

Scientists must be made aware of how important the impact of their work is and its possible applications on 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.

Synthesis is the official research bulletin of the University and is published by Research Management Centre. It is available free of charge to the academic community.

## Readership

Researchers, academicians, postdoctoral researchers, technicians, postgraduate studentships, research institutions, techno-entrepreneurs, venture capitalists and laypeople.

If you would like to receive a copy of the Synthesis for research updates every 4 months, or would like further information about Research Management Centre, please contact at the address given on this page or send an e-mail message to [editor@rmc.upm.edu.my](mailto:editor@rmc.upm.edu.my) with the only content in the body of the email message being "subscribe synthesis" to be added to the mailing list.



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