



# Synthesis

R&D Digest of Universiti Putra Malaysia

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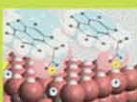
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## UPM – making of a Research University



Muhamad Zohadie Bardaie, Vice-Chancellor—Forging Ahead: Our continuing quest for excellence

Universiti Putra Malaysia (UPM) has made significant progress since it started as a School of Agriculture in 1931. Over the past decades, it has greatly transformed itself into one of the largest established premier institutions embracing research as an integral part of its mission, with agro-bio as our niche.

Having set a blueprint for e-university to attain a world-class status, our vision is clear. Our course is set. Sharing Malaysia's destiny in line with UPM's 10-year strategic plan, spanning from 2001 to 2010, and now setting ourselves to becoming a top research university is a worthy endeavor and an exciting prospect.

Advances in internationally-competitive infrastructure, research funding, major research collaborations and quality research training has enhanced our research profile tremendously.

Comprehensiveness is particularly important as more universities focus on interdisciplinary work, some have problems bringing people together from different fields because they are segregated within different faculties, research institutes and centers across the campus. By introducing the "research cluster" concept at UPM, we have now brought together broad variety of disciplines that exist in one university. The initiative of restructuring our research into niche priority areas and grouping them by research clusters is to nurture integrative research towards the development of commercialised research output, further strengthening and enhancing

R&D—thereby contributing significantly to the growth and development of the Malaysian economy.

This commitment really is intellectual commitment, where people can have excellence; people from different areas can come together. That is what a research university is, as opposed to just looking at the research that's funded. A research university will not be great unless all areas across the campus are excellent.

Each of us has a role to play. Equipped with our distinct R&D plan, we should pursue excellence in our typical areas of strength and realize our potential. Working together, our strengths and accomplishments will multiply and propel UPM through the turbulent and uncharted global economy.

With your support, we will put together a strong team to lead our University and build an organization where diverse minds, aspirations and pursuits will flourish. Our global mind, global aspirations and global pursuits will determine how well we stay the course and how far we go in our continuing quest for excellence.

I am confident that we have what it takes to seize the opportunities and rise to the challenges ahead. With your dedication and keen spirit, as we prepare ourselves for the challenges ahead, let us all take great pride in our university as we journey confidently towards making UPM, a premier research university.



## High-profile Public Lecture by a Nobel Laureate Richard Ernst at UPM

Nobel Laureate Richard Ernst, Professor in Chemistry, received the 1991 Nobel Prize in his work "for his contributions to the development of the methodology of high resolution nuclear magnetic resonance (NMR) spectroscopy".

He is scheduled to host a public lecture entitled, "Science and Our Future" on 20th July 2004 at Universiti Putra Malaysia, Serdang and a Science Motivation Session on 21st July 2004 at Universiti Tenaga Nasional, Kajang, Selangor.



## Promoting Innovation: Pivotal role in raising standards

The vision of moulding UPM into a world-class institution is now 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.

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 Geneva from 31st March to 4th April 2004 brought home medals each in different categories (2 Gold, 6 Silver & 2 Bronze). I would like to express my sincere appreciation for all these distinctive talents. A look at our winners at the Geneva 2004 exhibition.



**LAYING THE GROUNDWORK:**  
a pool of talent—Vice-Chancellor (center) and RMC director (3rd from right) with all of the 10 contestants who brought home medals each in different categories

Professor Dr. Abdul Salam and Assoc. Prof. Dr. Maznah Ismail from the Faculty of Medicine and Health Sciences and Professor Mohd. Azmi Mohd. Lila from the Veterinary Medicine received GOLD medals for their innovative research entitled E-ORY—Natural antioxidant rich nutraceutical formulation, and Nucleoceptin™—a novel vaccine for fertility control in animals respectively.

Recipients of Silver and Bronze medals are given below: (not in any particular order)

Medal	Scientist
1. Silver	Syed Omar Syed Rastan (Assoc. Prof. Dr.) and Ahmad Husni (Assoc. Prof. Dr.) Faculty of Agriculture
2. Silver	Fakhrul-Razi Ahmadun (Assoc. Prof. Dr.) Faculty of Engineering
3. Silver	Mohd. Azmi Mohd. Lila (Professor Dr.) Faculty of Veterinary Medicine
4. Silver	Mohd Zobir Hussein (Professor Dr.) Faculty of Science and Environmental Studies
5. Silver	Robiah Yunus (Dr.) Faculty of Engineering
6. Silver	Wong Shaw Voon (Dr.) Faculty of Engineering
7. Bronze	Mohd. Hanif Yaacob (Mr.) Faculty of Engineering
8. Bronze	Radin Umar Radin Sohadi (Professor Dr. Ir.) Faculty of Engineering

Each award winner is an inspiration to us. 

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## EDITORIAL BOARD

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## Science and Our Future

**Looking Ahead: Aspirations for a Nobel Laureate from UPM!**

Since 1901, one of the most anticipated events around the world every year within the scientific community has been the announcement of the Nobel Prize winners in December. While the deliberations are done in absolute secrecy, the announcement generally makes headlines around the world. The winners are toasted and the laureates' homelands bask in glory, appreciating the genius of their countrymen.

There are six Nobel Prize winners globally every year representing six fields of human endeavour - physics, chemistry, medicine, literature, economics and peace. The laureates are those who have engendered original and often revolutionary contribution to their respective areas and consequently to mankind. The prizes are given without discrimination. Yet for the last hundred years or so, this honour has gone to relatively few countries. The exalted assemblage consists predominantly of Western countries, with Americans dominating the list. Americans have won over half of the prizes since 1970. In fact the figure is closer to two-thirds these days. Only 22 out of the 533 prizes awarded so far had gone to people outside North America and Europe. The few Asian countries in this elite grouping include Japan, China, Taiwan and India.

### Looking ahead!

Southeast Asian countries, including Malaysia, have never won a Nobel Prize in the three science categories. In Malaysia, there appears to be a lack of coherent strategy to drive the research activities on all fronts. Many of our scientists here would probably have allowed the matter to slide if not for the call by the former prime minister, Tun Dr Mahathir Mohamad, in 1998 for Malaysians to strive for a Nobel Prize by 2020. While the appeal has not really galvanised the Malaysian institutions of higher learning as it rightfully should have, nevertheless it did help highlight some of the issues that could possibly impair the country's ability to achieve the targeted landmark. Some of these are merely challenges that can be overcome by a little ingenuity, and a huge dose of willpower?


To reach out to the international community and boost intellectual discourse in the country, the Academy of Sciences Malaysia (ASM) organised a Nobel Prize Centennial Exhibition Kuala Lumpur 2004 entitled "Cultures of Creativity: Individuals and Milieus" currently being held at National Science Centre that opened its doors for public from 20 March 2004 and will continue until 27 June this year. The exhibition was officially launched by YAB Dato' Seri Abdullah Ahmad Badawi, Prime Minister of Malaysia on April 29, 2004 at the Palace of Golden Horses, Mines Resort City.

In conjunction with this, ASM has also organised several public lectures in various parts of the country currently being held until June 2004. These high-profile lectures are being hosted by various world-famous Nobel Laureates, which include Nobel Laureate Professor Gerardus 'T Hooft, Nobel Laureate Professor Lee Yuan Tseh, Nobel Laureate Professor Carl E. Wieman, Nobel Laureate Professor Richard Ernst, Nobel Laureate Professor Harold Kroto, and Nobel Laureate Professor Ivar Giaever.

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. Adding to the intellectual buzz and vibrancy on campus is the stream of leading world authorities who made up the year's guest list.

A public lecture "Science and Our Future" by an internationally recognised eminent scientist and Nobel Laureate in Chemistry, Professor Richard R. Ernst will be held 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.

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!

See 'Reportage' for details on the program of Nobel Laureates visiting Malaysia. 

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## Development of Standardised Functional Foods from *Centella asiatica* (L) urban

Azizah Abdul-Hamid, Suhaila Mohammad, Nazamid Saari, Salmah Yusof, Mohd. Khairi Mohd. Zainol, Mahanom Hussein, Radzalie Musa, Maznah Ismail

Award Winner

Oxidative stress results when the balance between the production of reactive oxygen species (ROS) overrides the antioxidant capability of the target cell. ROS are very reactive molecules produced when one is exposed to pollution, cigarette smoke, stress, excessive sunlight, toxic compounds and intensive exercise. Reactive oxygen species have been implicated in the development of various diseases including atherosclerosis, liver injury, arthritis, aging, neurodegenerative disease and cancer. However, foods containing antioxidants may be used to aid the human body reduce oxidative stress and damages. Much attention has been focused on the use of antioxidants, particularly natural sources, to inhibit peroxidation and protect human body from oxidative damages by free radicals. "Pegaga" or scientific name *Centella asiatica*, has been traditionally used as folk medicine for healing of skin lesions (abrasion, cuts, burns, ulceration) and as a tonic for minimising aging, wrinkling of skin, stomach/duodenal ulcers, leprosy, genorrhoea, fever, lupus, eczema and psoriasis. Despite all the claims surrounding this herb, the underlying mechanisms in those effects were never effectively explained. More scientific data is required before recommendation for its use can be given with confidence.

In this study, antioxidative activity of various extracts (methanol, water, petroleum ether) from different parts (root, leaf, petiole) of different accessions of *centella asiatica* were evaluated using various assay systems. In addition, efficacy of *centella asiatica* in reducing oxidative stress in rats is also studied.

Results revealed that ethanol and methanol extract of *centella asiatica* demonstrated high antioxidative activity, in particular CA05, that is comparable to that of alpha-tocopherol and BHT with the root and leaf exhibiting highest activity. Results involving Sprague Dawley rats showed that, both *centella asiatica* powder (5%) and extract (0.3%) are effective in reducing the oxidative stress of hydrogen peroxide induced rats, as measured by level of malonaldehyde in the blood. Pegaga treated rats were also found to have lowest blood triglyceride and LDL-cholesterol content compared to the control. Similar trend was also seen with activity of superoxide dismutase and catalase of the rats measured.

Findings from this study suggested that the antioxidative activity measured might be due to the presence of phenolic compounds, in particular the flavonoids that were found to be in high concentrations in pegaga. This includes

myricetin, quercetin, catechin and rutin that are known to be potent antioxidants. The four flavonoids were then used as biomarkers in developing standardized functional foods, from *centella asiatica*, which includes herbal drinks, pastille and pasta. **RMC**

Variety of functional foods from Pegaga



**GOLD** – UPM Invention & Research Exhibition 2002.

### Reader Enquiry

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## ZAPPA™ - The Rice Seeds Germination Enhancer and the Control of "Padi Angin" Infestation

Syed Omar Syed Rastan, Ahmad Husni Mohd Hanif and Halimi Mohd Saud



Award Winner

The government aspiration to increase rice yield up to 10 t/ha may be hampered if infestation of "padi angin" or weedy rice cannot be controlled. Serious infestation of weedy rice had been reported to reduce rice yield up to 75%.

ZAPPA or "Zap Padi Angin" is specially formulated as paddy seed treatment to enhance rapid seed germination for direct seeding rice grown under aerobic and anaerobic systems. ZAPPA treated paddy seeds increased the root and shoot growth of 3-days old rice seedlings to about 130% and 62%, respectively. Paddy seeds treated with active oxygen in ZAPPA were able to grow vigorously under anaerobic direct seeding (about 5 cm water depth), thereby, delayed or suffocated the untreated weedy rice seeds present in the soil. The local verification trials of ZAPPA conducted on two farmers plot each 1.2 hectares in Sg. Besar, Selangor, which were previously infected with weedy rice had shown a yield increment between 40 and 57%. MARDI researchers in Tg. Karang and Bertam had also evaluated effectiveness of ZAPPA for seed germination and the control of the paddy angin.



ZAPPA™ - convenient 1 & 4litrs packing



Bags of Paddy seeds being treated with diluted ZAPPA™

The result showed that seeds treated with ZAPPA were able to grow at 5 and 15 cm of water depth. Others benefits of using ZAPPA were that it reduces weed problems, reduces rat attack because of standing water, conserves water usage (water is not removed after ploughing), reduces seed borne diseases, and increases seed purity.

Since March 2001, about 75,000 liters of ZAPPA has been sold nationwide. Many farmers have accepted ZAPPA for both the aerobic and anaerobic direct seeding due to its effects on seedling vigour that helps to compete with growth of the weeds.



ZAPPA PLUS reduces seed borne diseases. ZAPPA™ reduces seed borne diseases

**GOLD** – Invention & Research Exhibition Awards 2002.

**SILVER** – International Exhibition of Inventions, New Techniques & Products, Geneva 2004.

**SILVER** – Invention and Innovation Exhibition 2002 (Ministry of Science, Technology and the Environment, Malaysia).

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\*An update of the article published in Issue 1, 2nd Quarter (June 2003)





# Palm oil

## based synthetic bio lubricant



Robiah Yunus, Fakhru'l-Razi Ahmadun and Ooi Tian Lye


Award Winner

Palm oil represents readily biodegradable ester-type lubricants derived from renewable resources. However, to function as a lubricant, the inherent characteristics of inadequate oxidation stability, poor low temperature properties, and hydrolytic stability are impediments that must be overcome by the oil. To eliminate these negative properties, the innovation applies structural modifications to convert the palm oil to natural synthetic esters. By using a special type of polyol, the new synthetic ester is more stable than the original palm oil. This is known as fatty acids esters or specifically natural synthetic esters. These fluids are not as widely used because of their higher cost compared to vegetable oil-based fluids. However, due to the high and low temperature limitations of vegetable oil-based fluids, which fail under severe operating conditions, natural synthetic esters are now in demand. These fluids exhibit outstanding low temperature properties as well as good thermal and oxidative stability.

Palm oil-based synthetic ester or *Rysoil* is a new class of bio-based synthetic esters that uniquely combine biodegradability, high performance lubricity, superior oxidative stability and cold-temperature properties. *Rysoil* can be formulated to meet a broad range of applications, from hydraulic fluids to engine oils. It is developed by a group of researchers from the Department of Chemical and Environmental Engineering, University Putra

Malaysia. The research is funded by IRPA, Ministry of Science, Technology and Environment. The *Rysoil* product series are palm-based trimethylolpropane (TMP) esters, specially synthesized using our own technology. It uniquely combines efficiency and high productivity. Although earlier studies have reported slow reaction rates caused by sterically hindered components, our study has proven otherwise. Using this technology, the synthesis is 10 times faster and guarantees high product yield of at least 95% palm-based TMP triesters. Relatively mild condition and small amount of catalyst (0.9%) is needed in the synthesis.

The *Rysoil* products exhibit excellent thermal and oxidative stability. With a flash point of above 340°C, they are considered as non-flammable and fall under the category of Class III-B combustible materials. The products also pass the requirements of the DIN 51581 and ILSAC GF-3 specifications. The evaporation losses from these samples are very low at 2% as compared to the Noack volatility limit of 22%. Moreover, the problem with the pour point (PP) associated with the level of saturation in palm oil is resolved, as the PP is successfully lowered to -36°C in the palm based synthetic esters.

The technology is under patent pending with Malaysian Patent Registration Number: **PI 20030943**. 

\*An update of the article published in Issue 3, 4th Quarter (Dec, 2003).



SILVER – International Exhibition of Inventions, New Techniques & Products, Geneva 2004.

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# Optical Layer Automatic Protection Switch (APS) Module


MH Yaacob, MK Abdullah, AH Hussein, AAA Bakar,



Award Winner

Optical fiber networks PDH (140Mbps), SDH, WDM and DWDM have become the main system deployed on backbone trunks as well as the metropolitan area networks. One important factor for the deployment of any communication systems is the protection of the traffic. This is particularly vital for the sensitive networks such as the trunk SDH/PDH and the DWDM systems, which carry huge traffics. Thus, the requirement for a good protection system cannot be over-emphasized. In these networks, one minute of failure is disastrous enough to cause heavy losses.

In general, there are two approaches that are normally taken in providing the network protection: Re-routing and Back-up. Re-routing approach involves sending the traffic through different routes when there is a failure in a specific connection. However, in many cases, the larger network may be too large and re-routing cannot provide a good recovery time. In the second approach, two identical systems are installed for one specific link; one as working line, the other as a standby or protection line. Nevertheless, the disadvantage of this approach is that the system is not robust enough. Thus, a more reliable protection scheme is required to make sure that service continuity is guaranteed and enough time is provided for repair before a total failure takes place.

Optical Layer Automatic Protection Switch (APS) Module provides automatic switching between main and protection fibers (in case of faulty fibers) at the optical layer to support a survivable fiber optic link or network system. It is the perfect add-on solution for existing fiber optic links or network system equipment without fault-tolerant features. It offers solution to fiber data communication equipment without requiring any modification. It also provides alarms and indicators to warn the user of loss of the main local optical source and faults in the main fiber. Adding APS into the system will generate up to eight possible communication paths. This means that the system that uses APS will face a total failure only when both of the same elements of the main and back up networks fail. Therefore, unlike the conventional system, APS can still support the transmission when any other failures take place. 



Automatic Protection Switch

BRONZE – International Exhibition of Inventions, New Techniques & Products, Geneva 2004.

### Reader Enquiry

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# CRFNanopath: A Novel Nanocomposite-Based Controlled Release Formulation



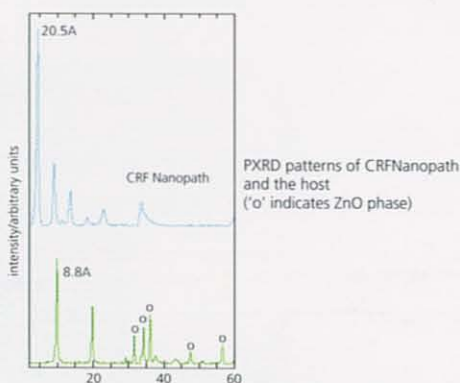
Mohd Zobir bin Hussein\*, Asmah Hj Yahaya,  
Zulkarnain Zainal and Dickens Wong Vui Foo

Award Winner

Delivery of beneficial agents, such as drug in human and other active agents in environmental and industrial applications such as pesticide and fertilizer from controlled release formulation (CRF) has lately attracted increasing interest. This is due to the advantages of CRF compared to its counterpart, such as prolonged duration of action of an active agent, minimized adverse reactions or maximized efficacy with tailor made properties and higher stability of the active agents in the formulation.

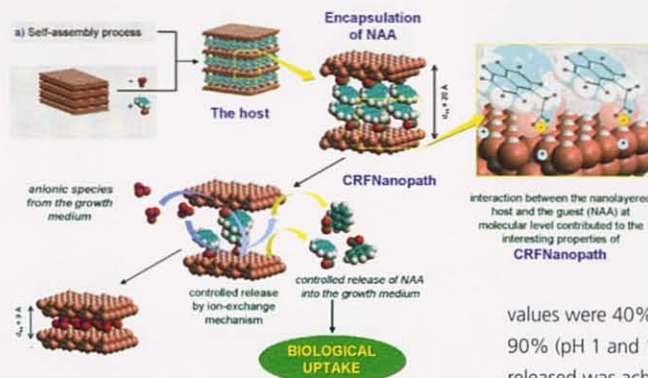
The concept of controlled release has been widely used in agricultural and pharmaceutical industries. In agriculture, controlled release pesticide formulations were designed to maintain an effective level of pesticide in the soil, thus reducing the number of pesticide applications required and minimizing the pesticide levels in the environment. In pharmaceutical industries, controlled release drug formulation was developed such that an effective level of drug in the body can be maintained for a specific period of time, thereby eliminating the side effects caused by administering high doses of the drug.

In the formation of CRFNanopath, the guest NAA is stored in the interlayer region of the host Zn-Al-LDH lamellae, a two dimensional type layered structure consisting of thin crystalline inorganic layers with a thickness of a few nanometers.



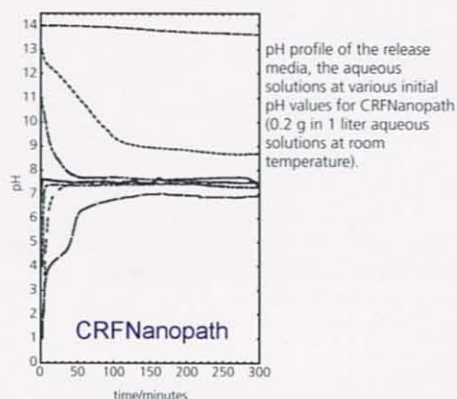
Encapsulation of NAA engineered at molecular level allows safer application of 1-naphthalene acetate with other advantages, such as higher stability, prolonged duration of action, minimized adverse reactions or maximized efficacy and environmentally friendly since the active agent is not in direct contact with the external. The process is relatively cheap and simple. The desired physicochemical properties can be designed/tailored by carefully matching the host and the guest.

The release of NAA for biological uptake can be safely achieved by taking advantage of the ion exchange property of NAA in the nanolayers with the anions in the surrounding solution.



CRFNanopath has the capacity to neutralize both acidic and alkaline aqueous solutions at different initial pH values (1-11) fairly rapidly. Equilibrium was achieved at pH 6.5-7.5 after 100 minutes. This shows that CRFNanopath exhibited buffering effect within this pH range.

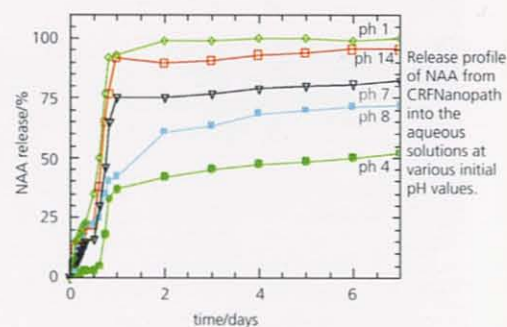
CRFNanopath could neutralize and buffer the solution with initial pH 13 to a level close to neutral, to pH 9. A similar phenomenon was also observed in the aqueous solution with initial pH 1. This suggests the neutralizing ability of this material.



The accumulated NAA released into the aqueous solution increased with contact time when CRFNanopath was put in contact with the aqueous solutions. The release rate was found to be faster in the first 18 h, thereafter a slower release was observed. Equilibrium was achieved after a day for the aqueous solutions with initial pH values of 1, 7 and 14.

At initial pH values of 4 and 8, the release rate was found to be rapid on the first day, followed by a slower rate thereafter and the release still continued even after 7 days. The rapid release pattern at pH 14 appears similar to that of pH 1. Percentage of NAA released into the aqueous solutions at initial pH 4 was observed to be the lowest.

At the end of the rapid release rate, the amount of NAA released from aqueous solutions at various initial pH values were 40% (pH 4 and 8); 75% (pH 7) and 90% (pH 1 and 14). Highest percentage of NAA released was achieved in highly acidic and alkaline aqueous solutions. At equilibrium, it was estimated that almost 100 and 90 % of NAA could be released into the aqueous solutions if the initial pH of the solution was set to 1 and 14, respectively. In the aqueous solutions with initial pH values of 7, 8, and 4, about 80, 70, and 50% of NAA, respectively could be released after 7 days.



MARS Special Award – S&T Expo 2002  
GOLD – S&T Expo 2002  
GOLD – UPM R&D Exhibition 2002  
SILVER – 32nd International Invention Exhibition, Geneva 2004

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# Research

Geneva 2004 - 32nd International Exhibition of Inventions New Techniques and Products (31 March to 4 April 2004)



UPM Vice-Chancellor Dato' Zobadie presenting the Malaysian Pride to the "chief de mission", Prof. Salaam while RMC Director, Dr. Shabuwabid congratulates



FAREWELL: Dato' Zobadie and Dr. Shabuwabid unfolding the "Jalur Gemilang" and UPM Flag with the delegation prior to their departure for Geneva on 26 March 2004



Prof. Salaam with his delegation on arrival at Geneva on 30th March 2004

## Patent Workshop (29 April 2004)



Welcome address by the Deputy Vice-Chancellor (Academic), Professor Mubamad Awang at the Patent Workshop organized by RMC on 29 April



Participants at the patent workshop inspired by the lecture on patenting



Mr. Lok Choan Hong, Director, Phytas IP Group Sdn. Bhd. lecturing on the patenting process



Dr. Zulkipli Idris, Deputy Director, RMC conducting the patent search exercise session during the workshop



Patent workshop in progress

## National Innovation Summit 2004 @ Palace of the Golden Horses (29 April 2004)



UPM booth at the National Innovation Summit, R&D and Innovation Showcase Exhibition held at the Palace of the Golden Horses from 29 April to 1 May 2004



From Left: Prof. Radin, Dr. Shabuwabid and Prof. Mubamad Awang expressing their views on innovating research at UPM

## Newsmakers—building rapport



HIS ROYAL HIGHNESS Sultan Sharafuddin Idris Shah Ibnu Almarhum Sultan Salabuddin Abdul Aziz Shah Alhaj shaking hands with Dato' Zobadie at the 23rd Reserve Officers Training Unit (PALAPES) commissioning ceremony held on 8 May at UPM



Malaysia's Deputy Prime Minister Najib bin Tun Hj. Abdul Razak, Dato' Zobadie and Professor the closing ceremony of the National Training Program (PLKN) in



THANK YOU: Dato' Zobadie sharing his joy with Dr. Shabuwabid & Dr. Sidek on his left and Prof. Mohd Azmi Lila & Dr. Maznah on his right



WELL DONE: YAB Datuk Seri Abdullah Ahmad Badawi, Malaysia's 5th PM congratulating Dr. Maznah on her research in Natural Product Biotechnology



INPEX 2004: a proud moment for UPM— Prof Radin with the delegates at KLIA who brought home 8 awards at this exposition held in Pittsburgh, USA from 12-15 May 2004



From Left: Dr. Chuah Teong Makdzir Manlan, Deputy (Development) and Dr. Sidek Expo held at Gallery Putra.



# Happenings



Dr Wong Shaw Voon displaying his exhibit at the PALEXPO—venue for the exhibition in Geneva



Dato' Zohadie congratulating the GOLD medalists, Prof. Mohd Azmi Lila and Dr. Muznab



WELCOME: Dr. Shahrubaidi (in black suit) welcoming the delegate at KLIA on 5th April after their grand victory at Geneva 2004 exhibition (2-Gold, 6-Silver & 2-Bronze)

## Cluster Workshop (7 May 2004)



Welcome address by the Deputy Vice-Chancellor (Academic), Professor Mubamad Awang at the Cluster Workshop organized by RMC on 7 May 2004



An Introduction on cluster concept by Dr. Zulkifli Idrus, Deputy Director, RMC



Participants at the workshop



QUESTIONS FROM THE FLOOR: an eager participant with her question on clustering

## Port (around the campus)



Dato' Zohadie giving away a token of appreciation to YAB Dato' Sri Najib



Dato' Zohadie, Professor Mubamad Awang and Prof. Radin at the annual dinner celebrations of the faculty of engineering on 19 December 2003



Dato' Zohadie with Mr. Mohd. Khata—at the official signing of the MoU between UPM & IPTS on 7 May 2004. Also seen are Mr. Suplan (left) from YIT Islamic Koley and Prof. Abdul Aziz (right) from Centre for External Education, UPM



Professor Dr. Aktini Fujimoto to serve as external evaluator UPM for Bachelor of Science (Agribusiness) program, with Dato' Zohadie and Prof. Khauf on 27 April 2004



Dr. Rustem Sunchelev demonstrating educational software for teaching Calculus to Prof. Mukhtazir and Dr. Sidek



From Left: Prof. Abdul Halim, Dr. Zulkifli, Prof. Dato' Kamel Ariffin and Parvez Iqbal during the mini ITEX 2004 Expo, Gallery Putra, UPM



Dean with Professor Dr. ... at the mini ITEX 2004 UPM



FOR THE RECORD: Professor Dr. Mukhtazir Mardani and the acting director, RMC, Dr. Sidek with the ITEX 2004 exhibitors from UPM



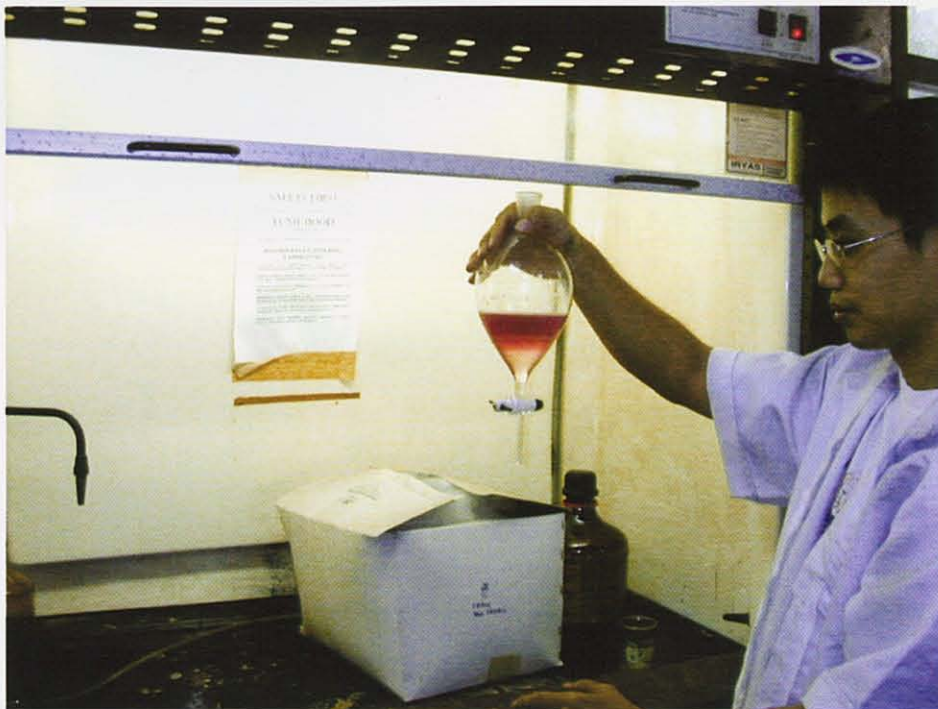
# Recovery of **Vitamin E** from Palm Fatty Acid Distillate Using Neutralization-adsorption Chromatography Method



**B.S. Baharin, B.S. Chu, S.Y. Quek, Y.B. Che Man**

**Award Winner**

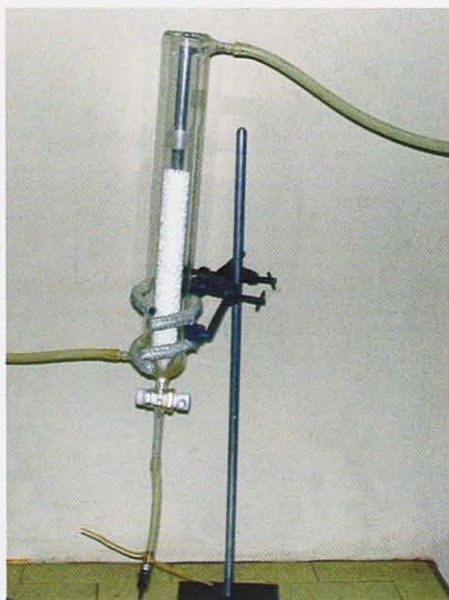
Vitamin E is a valuable vitamin found in palm oil. It is widely known that vitamin E plays an important role in the protection against free radical-mediated degenerative diseases such as cardiovascular diseases and cancers. Vitamin E in palm oil is extracted from palm fatty acid distillates (PFAD) obtained from deodorization process of palm oil refining process. Many attempts have been taken to extract vitamin E from PFAD such as saponification, molecular distillation, liquid-liquid extraction using solvents and etc. Most of these methods are complicated, energy-intensive and expensive. A comparatively simple and cheap, yet effective method was developed recently. In this study, vitamin E in PFAD was concentrated by removing the extraneous matters, especially the fatty components such as free fatty acid (FFA) and acylglycerols. The more the fatty components were removed, the more concentrated the vitamin E would be in the final product. Three separation steps were involved, namely hydrolysis, neutralization and adsorption



**Fig 2:** Neutralization is an important step to remove the free fatty acids in palm fatty acid distillate prior the adsorption chromatography.

chromatography. Acylglycerols in PFAD were first hydrolyzed using a commercial immobilized lipase. The fatty acids liberated, together with the existing FFA, were neutralized using sodium hydroxide. Vitamin E was then extracted using hexane. Hydrolysis followed by neutralization step concentrated vitamin E from initially 0.37 to 4.32%. Hydrolysis was an important step as without hydrolysis, neutralization could only concentrate vitamin E to 1.80%. Oil extracted from hydrolyzed and neutralized PFAD was then subjected to a normal-phase silica adsorption chromatography. The column was first eluted by hexane followed by isopropanol. A large amount of acylglycerols was removed during the first elution, while vitamin E was desorbed by isopropanol, with a recovery of above 90%. Vitamin E concentration after hydrolysis, neutralization and adsorption chromatography was 15.2%.

The method described in this study offers an alternative for the existing separation methods. It could be applied as one of a series of steps in producing high-purity vitamin E concentrate. **EMC**



**Fig 1:** The normal-phase adsorption column packed with silica is applied to further separate the tocopherols and tocotrienols from palm fatty acid distillate.

**GOLD** – UPM Invention & Research Exhibition 2002.

## Reader Enquiry

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# E-ORY – Natural Antioxidant Rich Nutraceutical Formulation

Award Winner



**Maznah Ismail, Abdul Salam Abdullah, Wafaa Hailat Mustafa and Azrina Azlan**

E-ORY is a new formulation of nutraceutical product with double strength protection against oxidation. Combination of 3 potent antioxidants (tocopherol, tocotrienol and gamma-oryzanol) with a high ratio of Tocotrienol:Tocopherol (3.28) helps combat a wide spectrum of oxidation-induced diseases. Tocols and gamma-oryzanol are highly available in palm oil and rice bran oil both of which can be obtained in abundance locally. This antioxidant rich formulation helps prevent free radicals from damaging cells in our body. Apart from the high level of antioxidants, E-ORY is low in saturated fatty acids but at optimum levels of monounsaturated and polyunsaturated fatty acids best for maintenance of a healthy heart. Findings from in vivo and human feeding trial based on single blind cross over design for a period of 24 weeks conducted in our University concluded that E-ORY reduced total serum cholesterol and low-density lipoprotein cholesterol but increase high density lipoprotein cholesterol. The LDL to HDL ratio of the subjects was also reduced. More importantly, this

product has improved plasma antioxidant status of the subjects. In addition E-ORY has been formulated for enhanced bioavailability of the antioxidants. The absorption of oryzanol in the formulation has been increased in the presence of tocotrienol. The antioxidant function of the combined active components working in synergy against cholesterol oxidation had contributed to the benefit of the formulation. E-ORY is safe as dietary

supplement for normal and those with high cholesterol level. Realisation of this formulation for commercial production provides significant health benefits paralleled to the economic impact on the utilization of rice bran, an important rice-milling by-product that is otherwise considered wasteful. **IMC**



**GOLD** – International Exhibition of Inventions, New Techniques & Products, Geneva 2004.

## Reader Enquiry

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# MechT™ Impactor - Pendulum Impact Test Unit

**Wong Shaw Voon, RS Radin Umar, AMS Hamouda, MMH Megat Ahmad and KS Tan**

MechT™ Impactor is a general purpose pendulum impact test unit with a special design arm that guides a striker for performing a dynamic impact test. The special designed arm gives excellent controllability on center of percussion, provides supporting surfaces for ease of attaching a striker and additional masses, and minimizes twisting moments resulted during impact when attached with additional masses. The design of the test unit is customizable and scalable from small size testing such as for Standard Charpy Impact Test of ASTM E23 and BS EN 10.045, to structural component testing and also to a large size sufficient to conduct full scale dynamic crash tests for whole motorcycle and even a car for R&D purposes. The flexibility of varying the impact masses and striker locations allows the MechT™ Impactor to perform a wide range of impact test configurations. Other advantages are ease of installation and operation, low maintenance work and costs, economical setup and operation costs and simple sensor housing.

The MechT™ Impactor has been fully tested through a series of impact tests and several characteristics and performances have been determined for Model PutrArm 275. The PutrArm 275 is able to provide consistent impact velocities at impact point with variation within 5%. The friction loss is found to be decreased with drop height (from 26% at 45Y to 11% loss at 85Y), implies greater mechanical efficiency can be achieved at higher impact speed. MechT™ Arm exhibited sufficient bending resistance as no significant permanent deflection has been detected, and no significant shock and vibration have been observed during and after impact with high-speed camera capturing at 1000 frame-per-second.

Numerous studies have been conducted successfully with sufficient repeatability and reliability by using MechT™ Impactor (Model PutrArm 275). Some of the major ones are:

- Study on influential factors for maximum residual crush of motorcycle wheel.
- Study on influential factors for energy absorption and change of velocity of motorcycle wheel.
- Study on correlation of impact energy to maximum residual crush of motorcycle wheel.
- Parametrical study on effects of impact dynamic characteristics of wheel-tyre assembly on the post-crash kinematics of motorcycle and rider.
- Analysis on catastrophic failure of the motorcycle hub under impact loading.

## Potential Applications:

- Standard test for motorcycle and passenger car wheel for type-approval.
- Alternative tool for SAE J1981 Standard impact test.
- Standard impact test tool for ASTM E23 and EN 10.045.
- Component impact testing for automotive and motorcycle industries for safety assessment.
- Standard test of energy absorbing/dissipating materials such as for the regulations MS 594, ECE R12 (Annex 5), ECE R21 (Annex 4) and ECE R44 (Annex 17).
- Replacement for standard drop-weight impact test.
- Enable equivalent full scale crash test of motorcycle and car at laboratory level. **IMC**



Award Winner



**SILVER** – International Exhibition of Inventions, New Techniques & Products, Geneva 2004.

## Reader Enquiry

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## I-TEX 2004 —International Invention, Innovation and Technology Exhibition and Competition

I-TEX is an international invention, innovation and technology exhibition and competition held annually since 1989 that attracts both national and international audience of inventors, venture capitalists, universities, companies and experts in the fields of R&D. Awards such as the prestigious WIPO gold medal are bestowed to winners of the invention and design competitions.

I-TEX is primarily organised by the Malaysian Invention and Design Society (MINDS) that provides a platform from which inventors and designers are able to generate ideas and successfully commercialise them into leading brands. Founded in 1986, MINDS is the largest body in Malaysia representing individuals, universities and companies who pursue excellence in invention, creativity, innovation, research and development, and industrial design. It is responsible for promoting high standards of invention and design, fostering professionalism and encouraging continuing professional development amongst its members. MINDS is active nationally and internationally and associated with the World Intellectual Property Organisation (WIPO) and the International Federation of Inventors' Associations. With support from the Ministry of Science, Technology and the Environment, Ministry of Domestic Trade and Consumer Affairs, Ministry of Education and SIRIM, MINDS has established itself as the leading body to support inventions and designers in Malaysia.

This year's show featured the latest in technology-driven products. Eight exhibits from UPM were displayed in the event held for three days from May 20-22 at the Mid Valley Exhibition Hall. All the eight won medals. Prof. Mahiran Basri from the Faculty of Science and Environmental Studies won a Gold medal for her exhibit *MBSofax*<sup>TM</sup>. In addition, UPM got 2 silver and 5 bronze medals at this exhibition.

## INPEX 2004

It was once again a proud moment for UPM when 4 of its scientists from the Engineering faculty recently won 8 awards at the INPEX 2004—Invention and New Product Exposition held in Pittsburgh, USA from 12-15 May 2004. INPEX is a unique trade show that showcases numerous inventions, new products and innovations that are available to business and industry. Dr. Mohamad Khazani who received a total of 3 awards. He won the "*Grand Prix Second Runner*", "*Best Invention of the Pacific Rim*" and a *Gold* medal (Science category) awards. Mr. Ratnasamy Muniandy got 2 prizes, "*Award of Excellence*" and a *Silver* medal in the Manufacturing category. Dr. Ishak Aris also received 2 awards, *Gold* medal in the Industrial equipment category, and a *Bronze* medal in the Science category. Last but not the least, Dr. Azmi Yahaya won the "*Merit Award*".

## Cluster Workshop


On May 7, 2004, Research Management Centre organised a one-day Research Cluster workshop. The objective of the workshop was to assist UPM IRPA project leaders to prepare and revise their concept paper for Prioritized Project (PR) and Strategic Project (SR) research grants. Four clusters were involved in the workshop namely Agriculture, Food and Forestry Cluster, Bioscience and Biotechnology Cluster, Information Technology and Mathematics and Health Cluster and Allied Science Cluster. 62 researchers from UPM, UM, UKM, MARDI, IMR attended the workshop and nine concept papers were presented. Officiated by Professor Dr. Muhamad Awang, Deputy Vice Chancellor (Academic), UPM the workshop was held at Dewan Putra, Faculty of Agriculture II, UPM.

## Patent Workshop

In an effort to create a patent culture in UPM, Research Management Centre (Policy, Planning and Finance Unit) offered a one-day workshop to provide relevant information on patent requirements and patenting process for researchers at UPM. 58 researchers across the university attended the workshop that was held at the Graduate School of Management, UPM on the 29th of April 2004 and officiated by Professor Dr. Muhamad Awang, Deputy Vice Chancellor (Academic), UPM. The workshop was conducted by Mr. Lok Choon Hong and Miss Yan Pei Chun from Pintas IP Group. Pintas IP Group Sdn Bhd recently has been appointed as one of the patent panels.

## Research Methodology Course

This 2-day course in Research Methodology was organised by Research Management Centre (RMC) to help improve the level of research competency among the participants especially who are involved in research activities at UPM and thereby increasing the research performance at UPM. The course was designed for research officers and other research staff from various faculties and research institutes across the university.

The course was hosted by the director, Research Management Centre on two consecutive days on 23rd and 26th April 2004 at Graduate School of Management and Faculty of Computer Science and Information Technology, UPM. About fifty participants were awarded certificates of participation upon the completion of the course. 



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

Continued from Issue 4, 1st Quarter (Mar.2004)...

No.	Faculty/ Institute	Researcher	Innovation	Research Cluster	Project Number	Allocation
87.	Educational Studies	Rahil Hj. Mahyuddin	Diagnosis of Children's Basic Skills Acquisition	SSH	07-02-04-0844-EA001	RM133,000
88.	Educational Studies	Sharifah Md. Nor	An Examination of Teaching Practices, Learning Needs and Climate of At-Risk Students	SSH	07-02-04-0846-EA001	RM279,960
89.	Educational Studies	Soh Kim Geok	Somatotype and anthropometrik measurement comparison among Malaysia netball and basketball players	SSH	07-02-04-0810-EA001	RM56,280
90.	Educational Studies	Zaidatul Akmaliah	Lope Pihie Evaluation Teaching and Learning In Business Using Service Quality Factors	SSH	07-02-04-0538 EA001	RM197,290
91.	Engineering	Abdel Magid Hamouda	Design And Fabrication of A Bullet Proof Vest Using A Hybrid Composite Material System	MEE	03-02-04-0494 EA001	RM245,000
92.	Engineering	Abdel Magid Hamouda	Damage Management of Sheet Metal Forming using Virtual Manufacturing	SAE	03-02-04-0407 EA001	RM168,640
93.	Engineering	Abdul Aziz Abdul Samad	Development of Expert System for Distress	SAE	03-02-04-0137 EA001	RM201,000
94.	Engineering	Abdul Aziz Abdul Samad	Development of Embedded Smart Sensing using Fibre Bragg Gratings and their performance I Real-time Monitoring of Prototype Structures	SAE	03-02-04-0136 EA001	RM127,000
95.	Engineering	Abdul Aziz Jaafar	Mathematical model and algorithm development for the flow and heat transfer on film-cooled turbine blades	MEE	09-02-04-0616-EA001	RM188,500
96.	Engineering	Abdul Ghani Liew Abdullah	Formulation and Evaluation of Polyelectrolyte from Moringa oleifera Seeds on Its Preservation and Effectiveness as Coagulant and Goagulant Aid	SAE	09-02-04-0848-EA001	RM149,000
97.	Engineering	Abdul Rahman Ramli	Development of Real-time Data Acquisition and Remote Monitoring System	SAE	09-02-04-0257 EA001	RM84,500
98.	Engineering	Abdul Rashid bin Mohamed Shariff	Image Analysis of Oil Palm Fruitslets	SAE	01-02-04-0513-EA001	RM157,160
99.	Engineering	Anvar A. Ashrabor	Development of High-Performance Concrete Using Local Materials Subjective to Tropical Environment	MEE	03-02-04-0138 EA001	RM134,600
100.	Engineering	Ashraf Ali Omar	Mathematical Modeling of Fluid flow Through High Lift Devices	SAE	09-02-04-0433 EA001	RM185,000
101.	Engineering	Ashraf Gasim Eisd Abdalla/ Borhanuddin Mohd. Ali	Development of Air Interface based Technologies on Reprogrammable hardware for Access Point in the next Generation Wireless Networks	ITM	04-02-04-0179 EA001	RM185,000
102.	Engineering	Azni Idris	Advanced oxidation using electro-chemical activation and UV radiation for the destruction of toxic and hazardous wastes	MEE	03-02-04-0139 EA001	RM218,000
103.	Engineering	Badronnisa Yusof	Modeling the effects of vegetation growth on the hydraulic performance and the water quality in a tropical river system	SAE	08-02-04-0611-EA001	RM212,000
104.	Engineering	Bujang Bin Kim Huat	Deformation and Shear Strength Characteristics and Index Properties of Peat and Organic Soils with Variable Fiber and Organic Content	SAE	09-02-04-0434 EA001	RM115,500
105.	Engineering	Chuah Teong Guan	Process simulation and modeling of rigid ceramic filter for high temperature gas cleaning industrial application	SAE	09-02-04-0702-EA001	RM142,000
106.	Engineering	Dadang Mohamad Masoem	The development of Malaysian Traffic Injury Surveillance Information System for Analyzing The Relative Road Accident	SAE	09-02-04-0750-EA001	RM153,640
107.	Engineering	Faizal Mustapha	A Knowledge based approach on troubleshooting aircraft engine and parts for Air Wing Unit (UUP-PDRM)	SAE	09-02-04-0543 EA001	RM144,620
108.	Engineering	Fakhru'l-Razi Ahmadun	Synthesis of high performance environmental friendly biodegradable lubricants from vegetable oils	AFF	03-02-04-0145 EA001	RM249,000
109.	Engineering	Husaini Omar	The strength measuring device for soils and pavement materials	SAE	03-02-04-0409 EA001	RM132,000
110.	Engineering	Iyuke Sunny	Esayegbemu Innovative environmental friendly and cyanide free cassava flour processing in bioreactor and absorber systems	MEE	09-02-04-0437 EA001	RM152,100
111.	Engineering	Jamaloddin Noorzaei	Structural Behavior of High Concrete Faced Rock fill Darms	SAE	09-02-04-0751-EA001	RM172,000
112.	Engineering	Ling Tau Chuan	The development of rapid and selective technique for the direct recovery of intracellular proteins from bakers' yeast	SAE	09-02-04-0621-EA001	RM200,100
113.	Engineering	Md.Liakot Ali	Development of an FPGA-based SoC For Low Cost IC Testing	SAE	09-02-04-0829-EA001	RM178,000
114.	Engineering	Medyan Riza	Synthesis and Characterization of and advance polymer for use as a barrier packaging	SAE	09-02-04-0703-EA001	RM154,500
115.	Engineering	Megat Johari Megat Mohd. Noor	Design and Development of Membrane Bioreactor for Treating High Strength Municipal Wastewater	MEE	09-02-04-0441 EA001	RM172,160
116.	Engineering	Mohamed Daud	Intelligent Spatial Knowledge-based System for Risk Assessment, Risk Management and Response to Crisis	EAM	08-02-04-0425 EA001	RM149,600
117.	Engineering	Mohammad Nizam Filipki Abdullah	Micro-Satellite Attitude Control System Design and Simulation	SAE	09-02-04-0443 EA001	RM105,626

to be continued...

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

<sup>2</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

## Education, Innovation & Research: Nobel Laureates and their Scientific Contributions

The Nobel Prizes recognize individuals and organizations that have conferred the greatest benefit on mankind in the areas of chemistry, literature, medicine, peace, and physics, and economics.

In order to create public awareness of the Nobel Prize and the scientific contribution of Nobel Laureates and to set a stage for Malaysia to embrace a culture of creativity, the Ministry of Science, Ministry of Science, Technology and Innovation, Malaysia (MOSTI) together with Academy of Sciences Malaysia and the National Science Centre has organised series of high-profile public lectures in Malaysia to educate the world about the achievements of Nobel Laureates and to inspire Malaysians to strive for excellence in science. Various world-famous Nobel Laureates, which include Professor Gerardus 'T Hooft, Professor Lee Yuan Tseh, Professor Carl E. Wieman, Professor Richard Ernst, Professor Harold Kroto, and Professor Ivar Giaever will be hosting public-lectures at various venues throughout the country.



**Nobel Laureate Gerardus 'T Hooft**, Professor in Physics, received the 1999 Nobel Prize in his work "for elucidating the quantum structure of electroweak interactions in physics".

He hosted motivational dialogues and public lectures entitled, "The Universe Inside the Atom" on 2nd March 2004 at University of Malaya, and "Admiring and Enjoying Our Universe" on 5th March at Universiti Sains Malaysia, Penang.



**Nobel Laureate Lee Yuan Tseh**, Professor in Chemistry, received the 1986 Nobel Prize in his work "for his contributions concerning the dynamics of chemical elementary processes".

He hosted two public lectures entitled, "Meeting the Challenges of the 21st Century" on 8th May 2004 at Kuching, Sarawak and on 11th May 2004 at Universiti Teknologi MARA, Shah Alam, Selangor. He also held a Special Forum with Scientist and Researchers at Universiti Malaysia Sarawak, Kota Samarahan, Sarawak on 10th May 2004.



**Nobel Laureate Carl E. Wieman**, Professor in Physics, received the 2001 Nobel Prize in his work "for the achievement of Bose-Einstein condensation in dilute gases of alkali atoms, and for early fundamental studies of the properties of the condensates".

He is scheduled to host a public lecture and a Science Motivation Session from 14-15th June 2004 at Universiti Teknologi Malaysia, Skudai, Johor. In addition he is also expected to deliver a public lecture at the Multimedia University, Cyberjaya on 17 June.



**Nobel Laureate Harold Kroto**, Professor in Chemistry, received the 1996 Nobel Prize in his work "for his discovery of fullerenes".

He is scheduled to host a public lecture on 26 June 2004 at National Science Centre, Bukit Kiara, Kuala Lumpur, and a Science Motivation Dialogue with Malaysian Scientists and Young Scientists on 28th June 2004 at Universiti Malaysia Sabah, Kota Kinabalu, Sabah.



**Nobel Laureate Ivar Giaever**, Professor in Physics, received the 1973 Nobel Prize in his work "for his experimental discoveries regarding tunnelling phenomena in semiconductors and superconductors, respectively".

He is scheduled to host a public lecture and a Science Motivation Session later in November/December this year at the Kolej Universiti Sains dan Teknologi Malaysia or Sabah.



INSPIRATION TO STRIVE FOR EXCELLENCE: World-famous Nobel Laureate Professor Zewail (centre) with top officials from UPM, during his visit to UPM in October 2002

Continued on page 10

## 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, technopreneurs, venture capitalists and laypeople.

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