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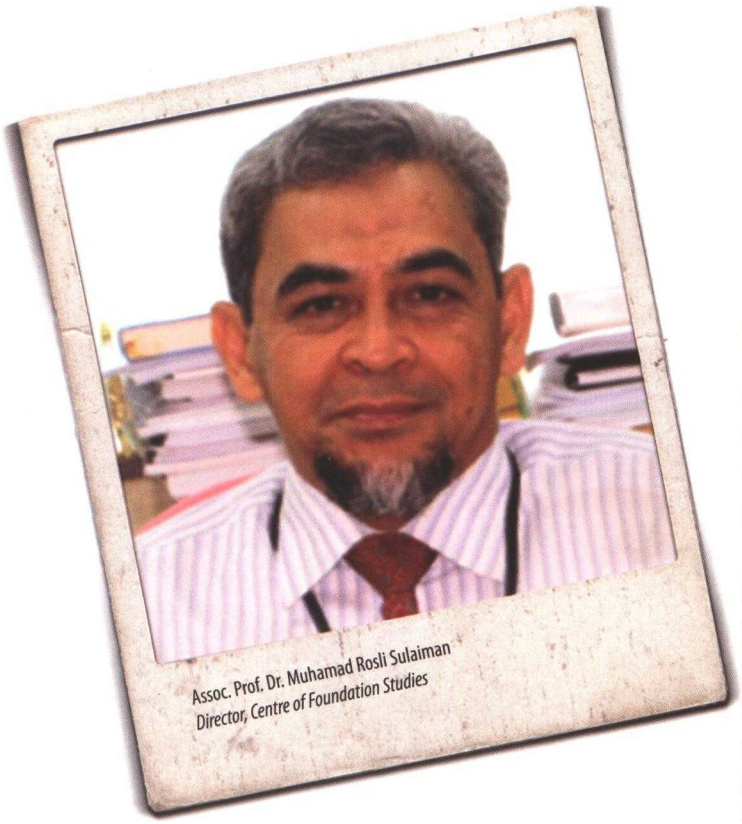
Director's Message



Assoc. Prof. Dr. Muhamad Rosli Sulaiman
Director, Centre of Foundation Studies

by Assoc. Prof. Dr. Muhamad Rosli Sulaiman

Congratulations to the Research Bulletin Committee for successfully publishing our first edition of Asasi Newsletter. In this newsletter, all the research papers presented in seminars and conferences by the Centre of Foundation Studies' (CFS) lecturers are being compiled for knowledge sharing. I am very pleased to see a considerable number of research papers being presented both locally and abroad. This noble effort will certainly put UiTM on the world map.

Although CFS is very much a teaching and learning centre at the preparatory level, each and every lecturer is expected to do research and present his/her findings as technical papers in conferences or publish them in journals. CFS is always supportive of lecturers who carry out research activities as this will enhance their career progression. Lecturers are also encouraged to link themselves with research groups from other faculties so as to overcome our limited resources.

I wish to see more research output when we move to our new campus in Dengkil next year.

Best of Luck!!

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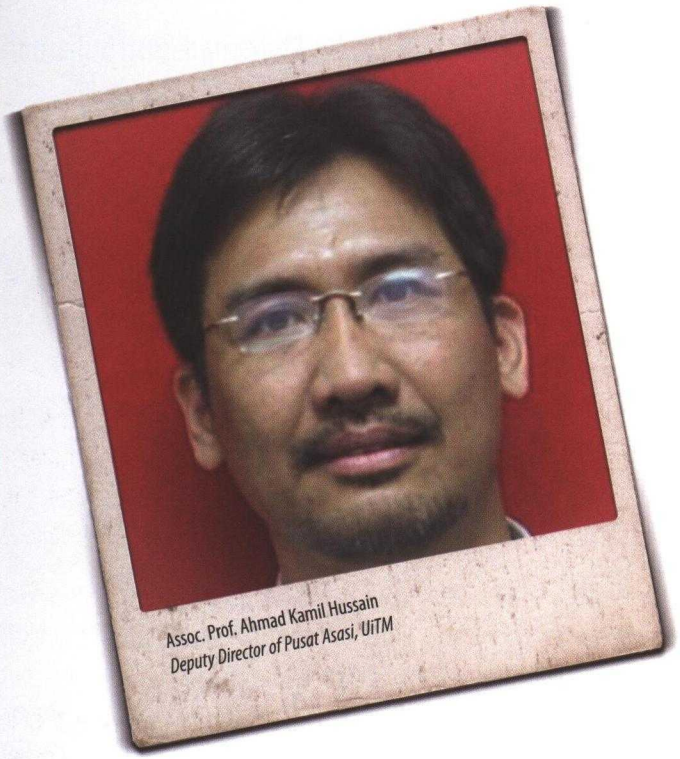
Future CFS campus in Dengkil

An interview with Assoc. Prof. Ahmad Kamil Hussain, Deputy Director of Pusat Asasi, UiTM



Assoc. Prof. Ahmad Kamil Hussain
Deputy Director of Pusat Asasi, UiTM

UiTM's quality objectives are to see a marked increase in lecturers and administrators and an involvement in research, writing and publication. The Organizing Committee took this opportunity to interview our deputy director on his thoughts and reflections regarding the Centre of Foundation Studies (CFS).

Q : Could you please describe yourself and anything that you feel is important for us to know about you as a Deputy Director in CFS.

A : I have been the Deputy Director of Pusat Asasi since November 2010. My past management experiences include being the Deputy Dean and Head of Diploma Programme in the faculty of Mechanical Engineering, and also the Head of American Engineering Programme at the Centre of Preparatory Studies. I started my teaching career way back in 1987 when working as a contract Tutor at SUNY/KPP/ITM. At Kolej Pengajian Persediaan or KPP (now Intec) the nation's top students are taught foundation level courses before they continue their studies abroad. Here in Pusat Asasi, it is a great privilege for me to have a similar opportunity to teach and serve our young top students again.

Q : What is the one most important thing for people to know about CFS UiTM?

A : Our strength lies in warga Asasi, most importantly our students. CFS has contributed significantly to generating a pool of quality students with sound foundation knowledge and skills for entry into competitive degree programmes. Our students have the reputation for being the most sought-after candidates for IPTA. A study (though not extensively conducted) has shown that the CGPAs of our students were better than their peers with diploma after finishing 3rd semester and onwards.

Q : What is your opinion about the students' and lecturers' accountability?

A : PEMANTAUAN PROFESIONALISMA PENSYARAH (PRO-PENS) has been conducted every semester and the average scores for our lecturers range between 80 and 90 (very good) where 90 to 100 being excellent. Two accountability components being monitored are punctuality and attendance for lecture/tutorial/lab. Most of our students have the right attitude towards learning and achieving their goal. Hence as far as accountability is concerned, only a few may need to be reminded from time to time to toe the line.

Q : What was the most challenging part you've encountered and how did you handle it?

A: I have received full support from all the administrative staff members and the lecturers, so I enjoy doing my work and honestly at no time I feel stressful or encountered with a challenging task. However after we have moved to Dengkil campus, I foresee that it will be a totally different story. The scenarios at Asasi Dengkil are there will be four Asasi programmes under one roof, a potential full house of 5000 students with limited number of lecture halls coupled with an absence of designated examination rooms, that's when the going gets tough.

Q : Where do you expect CFS to be in five years' time?

A: In five years time I expect CFS to be among the leading players in UiTM in using modern tools/skills in Teaching and Learning (T&L) and Blended Learning. To become a modern educator/learner (E&L), we and our students must be innovative, tech savvy and sociable. The modern educator/learner must try new things/processes/ approaches, and be innovative, and must explore new gadgets such as iPads/Notes/Tabs and use them in lecture halls, and furthermore must constantly connect to social networking so that T&L interaction and conversation can take place outside classrooms. Hence, T&L will be more exciting and more importantly, learning will be more effective. In research, in five years time CFS will contribute a large number of research articles on T&L.

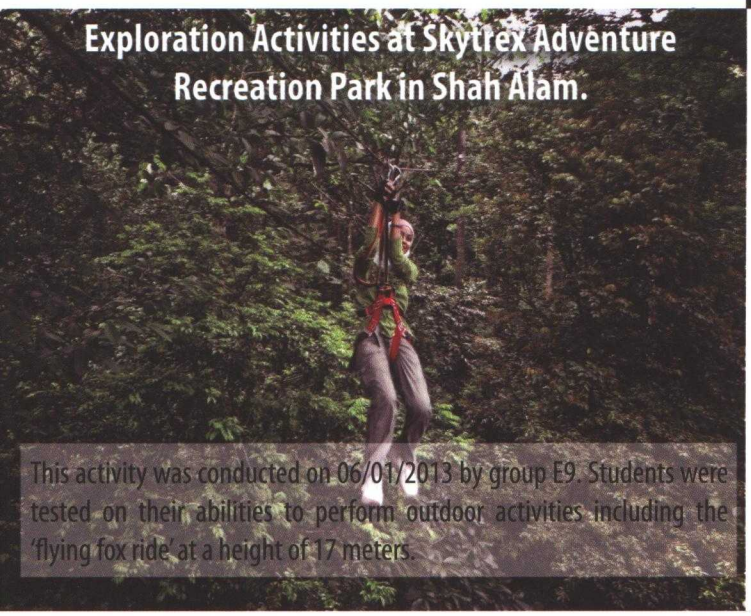
Q : What is your opinion regarding the 1st issue of Asasi Newsletter?

A : This newsletter will be the showcase of the activities that have taken place at Pusat Asasi. I am really looking forward to the birth of the first edition. My praise to the team who has made the publishing of this newsletter a success. Keep up with the good work.

Mentor- Mentee Programme

To develop a closer relationship between mentors and mentees, various activities were undertaken by students and lecturers together for each group on weekends or during semester breaks. These activities help students to relax their minds and to test their endurance. During the previous two semesters (Jun 2013-Mac 2014), the following activities were implemented by various groups:

Exploration Activities at Skytrex Adventure Recreation Park in Shah Alam.



This activity was conducted on 06/01/2013 by group E9. Students were tested on their abilities to perform outdoor activities including the 'flying fox ride' at a height of 17 meters.

Jungle Trekking at FRIM, Kepong

Jungle trekking at FRIM was conducted by group F1 accompanied by their mentor, Assoc. Prof. Dr. Nor' Aini. By doing this activity, students were able to appreciate nature and also to observe the interactions in nature so as to better understand the ecology subject in the biology course.

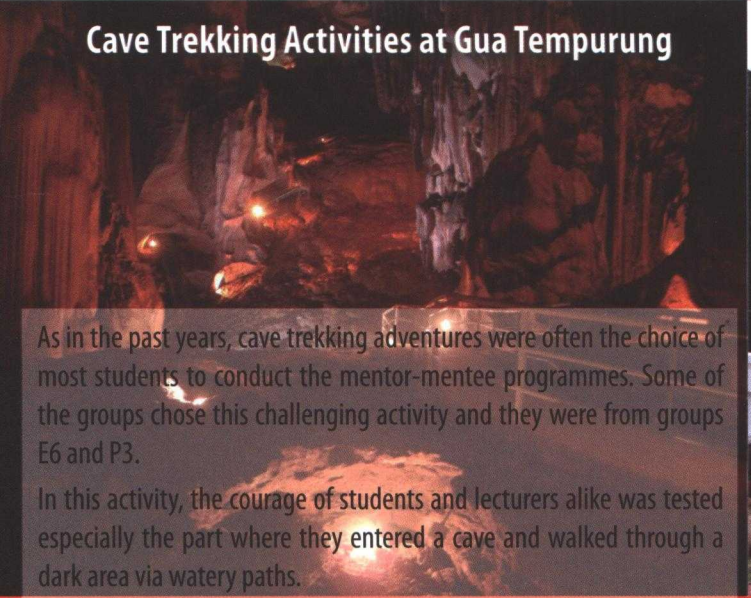
Jungle Trekking at Broga Hills

Groups B2 and F8 also chose to engage in jungle trekking but at a different location, Broga Hills. They stayed overnight at this camp. Apart from that, they went kayaking and did archery.

Recreational Activities at Bukit Merah, Perak

Students from group E3 chose to relax their minds by doing water related activities such as kayaking and boating at this park. The students were accompanied by their mentor, Pn. Lizayati.

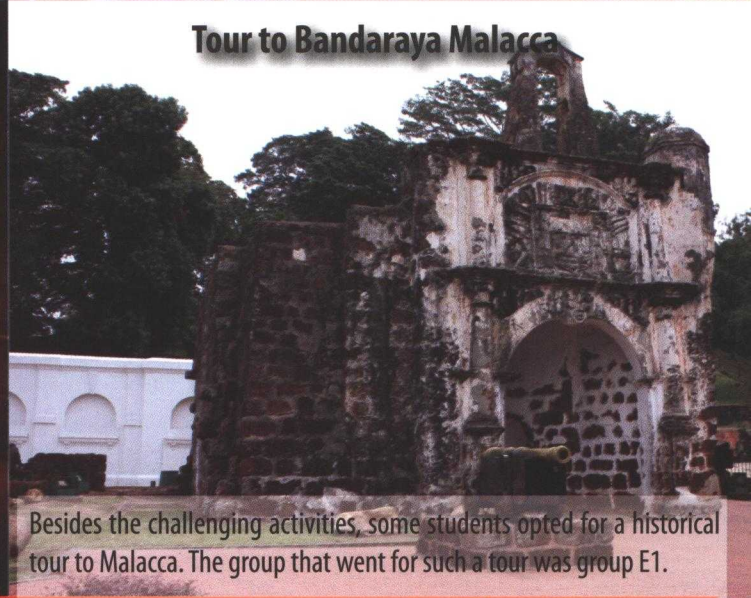
Cave Trekking Activities at Gua Tempurung



As in the past years, cave trekking adventures were often the choice of most students to conduct the mentor-mentee programmes. Some of the groups chose this challenging activity and they were from groups E6 and P3.

In this activity, the courage of students and lecturers alike was tested especially the part where they entered a cave and walked through a dark area via watery paths.

Tour to Bandaraya Malacca



Besides the challenging activities, some students opted for a historical tour to Malacca. The group that went for such a tour was group E1.

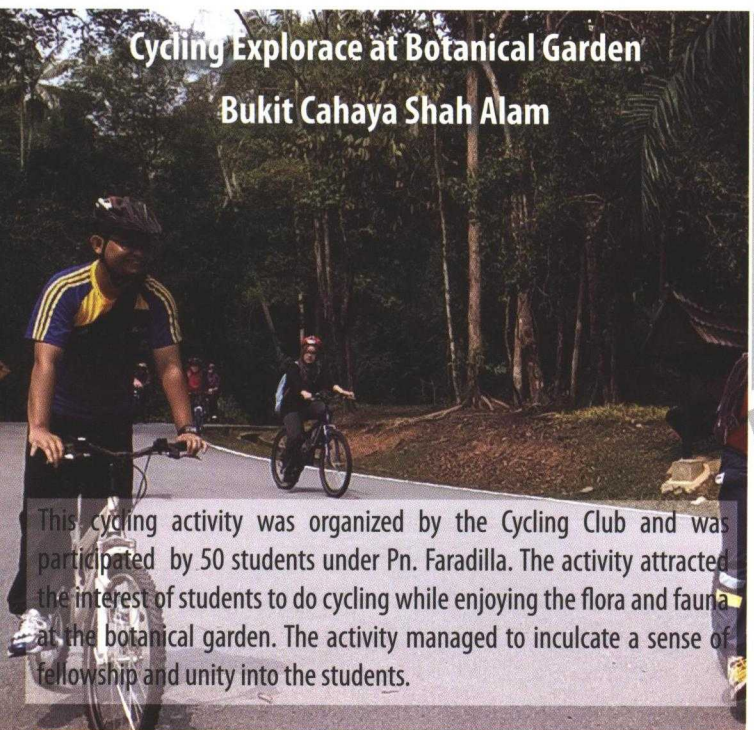
Co-curricular Activities

In the foundation course, students are encouraged to excel not only in academic studies, but also in extra-curricular activities. A myriad of activities ranging from sports, recreational, domestic science like cooking and sewing, community services and etc are offered for students to participate. Students who participate in a particular activity will form a club oversee by two to four lecturers. The co-curricular activity provides opportunities for the students to acquire the relevant skills. Therefore, co-curriculum is a compulsory subject for all students in the foundation studies. The following were some of the activities conducted by various clubs formed by the previous batch of Asasi students.

Hari Raya Celebration with Orphan Kids at Rumah Kasih Harmoni Paya Jaras

This activity was conducted by the Community Club led by En. Zaid Mujayid.

Cycling Explorace at Botanical Garden Bukit Cahaya Shah Alam



This cycling activity was organized by the Cycling Club and was participated by 50 students under Pn. Faradilla. The activity attracted the interest of students to do cycling while enjoying the flora and fauna at the botanical garden. The activity managed to inculcate a sense of fellowship and unity into the students.

The Grand Annual Tournament

In order to practice a healthy life style, a few sports club such as netball, tennis and futsal conducted their grand tournaments. The final round of the tennis tournament was held at Kompleks Sukan UiTM Shah Alam while netball was held at UiTM Puncak Alam.

Asasi Events

Every year after the appointment of the student secretariat committee, the committee will organize and hold major events called 'Memilih Menara Gading' and students' annual dinner in order to celebrate the conclusion of their courses.

'Memilih Menara Gading'

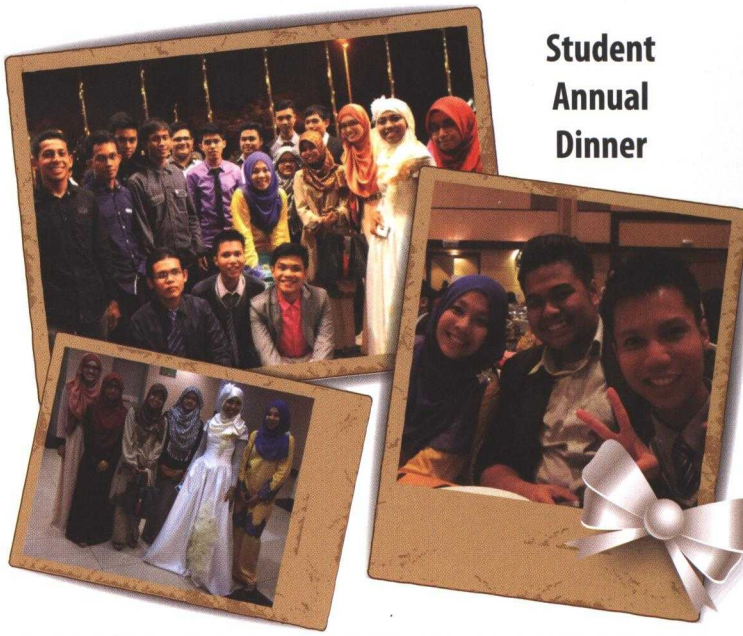
This event was held on February 15, 2014 at the Faculty of Pharmacy UiTM Puncak Alam. The programme was conducted in order to give students the opportunity to have an overview of the courses that could be selected to pursue at their degree level studies. This programme was participated by various universities such as UTM, UIA, USM and others. Besides that, there was a slot where talks were given to the students by speakers from the respective universities about medical and engineering courses.

Staff Events

Among the activities organized for the staff were as follows:

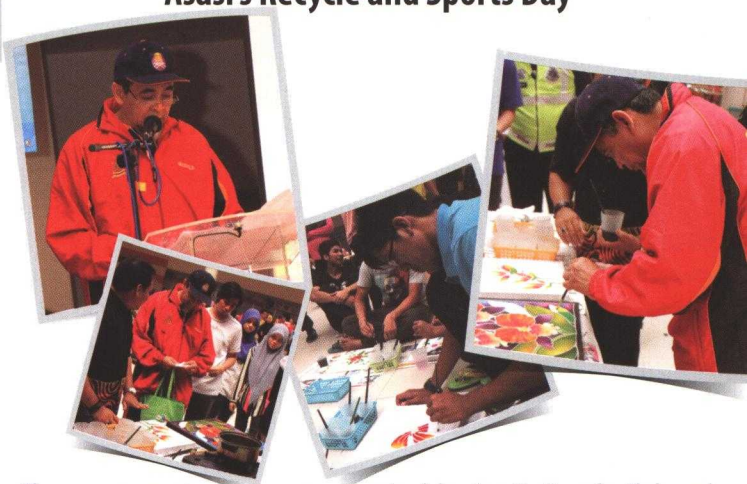
- Sambutan Hari Raya 2013
- Family Day at Morib
- Bowling Tournament at Setia City Mall

Student Annual Dinner



Students from semesters Jun 2013- Mac 2014 celebrate the conclusion of their Asasi programme by organizing a grand dinner with the theme 'Stellar Night' held at SACC, Shah Alam. In this event, various groups of students gave performances showing their talents in singing, acting and playing musical instruments. The highlight of this event was a few students winning the grand prizes for the lucky draw.

Asasi's Recycle and Sports Day



These concurrent events were organized by Asasi's Recycle Club and Secretariat of Mahasiswa (SMA) under the supervision of Puan Siti Fatimah Aminuddin and Puan Ainul Hafiza Abdul Hair, respectively on the 8th March 2014. The highlights of the events were to increase the awareness on the importance of recycling in community as well as to encourage healthy lifestyle among students. Many activities have been conducted successfully, such as marathon, sports matches (netball, futsal etc), recycled items (newspaper, plastic, aluminium etc) collection, batik's design invention competition and coloring contest for children. Kudos to all students and lecturers who have been involved in making this event a huge success!

The following are the upcoming events planned for 2014.

- Science Fun Day at Puncak Alam's Primary School
- Student Annual Dinner
- Memilih Menara Gading 2014

NATURE'S MOST ELEGANT CREATURES

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Butterfly which occurs in a myriad of species is the best choice of all insects to examine its pattern of terrestrial biotic diversity and distribution. Besides, the attractive colour and pattern on the wings of butterflies project a favorable image among the general public. Therefore, butterfly has become an excellent communication tool to propagate scientific information, biological diversity and conservation issues (Fatimah, 2006). Butterflies belong to the insect order, Lepidoptera and suborder Rhopalocera (Corbet et al., 1992) which is one of the largest orders of insects (Romoser and Stoffolana, 1994).

Majority of the Lepidoptera are harmless and play an important role in maintaining the delicate balance of our natural environment. The present study aims at identifying the diversity of butterfly species in three locations in Malaysia. The study on butterfly fauna is carried out through 3-man sweep-netting samplings, in Hutan Lipur Ulu Kenas (location A), Air Terjun Bubu (location B) and Lata kekabu (location C). The butterfly was killed by pressing their thorax and kept in an envelope with the sampling date and locality written on it. In the preparation process, the specimen was kept in the desiccator with warm water in it for 20 minutes, after which, the wings of the specimen were mounted on a spreading board and dried in an oven at 40^0C before the identification process. Each identified specimen was properly labelled with generic, species and family name together with the sampling location and date and the name of the collector (Zaidi et al., 2009).

From the preliminary study, a total of 134 species in 66 genera under 5 families, i.e., Nymphalidae, Lycaenidae, Pieridae, Hesperiidae and Papilionidae were found in these three locations combined. Analysis using Shannon-Weiner H' index values indicated that the butterfly species diversity in location C (H'=3.97) was significantly higher than those in locations A (H'=3.74) and B (H'=3.66). However, the Shannon-Weiner E' values found for locations A, B and C were 0.92, 0.91, and 0.94, respectively, which are close to the value of 1, suggesting that the butterfly species evenness in these locations was high. Therefore, it is desirable to mark these three locations as butterfly fauna conservation areas.

Keywords: Lepidoptera, fauna, species diversity, species evenness

References:

Corbet, A.S., Pendlebury, H.M. and Eliot, J.N.,(1992). *Butterflies of the Malay Peninsula*, 4th Edition, Kuala Lumpur: The Malayan Nature Society, pp. 597

Fatimah, A. (2006). *Butterflies of Malaysian Borneo - A Pocket Guide*, Sarawak, Malaysia: Universiti Malaysia Sarawak, pp. 130.

Romoser, S.W. and Stoffolano, G.J.,(1994). *The Science of Entomology*, 3rd Edition, Iowa, USA: Wm. C. Brown Communications, Inc., Dubuque, pp. 532

Zaidi, M.I., Azman, S. and Noor-aizan, M.N. (2009). Butterfly fauna (Lepidoptera: Rhopalocera) of Lubuk Tapah sector of Taman Negara Endau Rompin, Johor. Serangga, **14**, pp. 49-65

PTERIDOPHYTES COMPOSITION IN 0.24 HA PLOT OF ENDAU ROMPIN STATE PARK, ROMPIN, PAHANG

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Endau Rompin State Park is one of the forest reserves in Malaysia with high diversity of flora including mosses, ferns and higher plants. Ferns are classified under Pteridophytes The objective of this study is to determine the pteridophytes composition, abundance, diversity as well as community similarity. Four plots of total area 0.24 hectare were set up at different environmental gradient and all the ferns in these four plots were counted and identified. A total of 3351 individuals of pteridophytes comprised of 33 species in 25 genera and 19 families were found. Polypodiaceae is the largest family in terms of the number of genera and species with a total of 4 genera, 5 species and 74 individuals. Meanwhile, *Linsaea* (Lindsaeaceae) with 4 species in total is a genus with the highest number of species. *Hymenophyllum* (Hymenophyllaceae) which comprises 1000 individuals is the most abundant genus based on the number of individuals. Additionally, Hymenophyllaceae is also the most dense family with 4179 ind/ha while *Hymenophyllum serrulatum* is the most dense species with 4166.67 ind/ha. Five families with the highest frequency (75%) are Lindsaeaceae, Polypodiaceae, Pteridaceae, Selaginellaceae and Tectariaceae. Hymenophyllaceae has the highest Importance Family Value Index, FIVi = 18% whereas Thelypteridaceae and Lygodiaceae both exhibit the lowest FIVi of 1.53%. *Hymenophyllum serrulatum* attains the highest Importance Species Value Index, SIVi = 16.20%.

Various quantitative measures were evaluated to reflect species composition and diversity of the fauna in a dataset. The Shannon-Weiner Diversity Index (H') indicates the species diversity while Margalef Richness Index (R) represents species richness. Lastly, Sørensen Coefficient of Similarity is used to assess the degree of species similarity between the study plot and plots in other areas. The species composition and diversity determined in this study is as follows: H' is 2.15 with $H_{max} = 3.46$, Shannon-Weiner Evenness Index (E) is 0.62 and $R = 3.94$. The degree of similarity among all the plots studied is very low. However, the plot which is located at Padang Tujuh (400m alt.) displays a totally different pteridophytes composition, abundance and diversity from the other three plots because it is fully exposed to sunlight.

Keywords: Pteridophyte, Fern, Species composition, Endau Rompin

MICROPROPAGATION OF TISSUE CULTURE DERIVED FROM PLANTS OF CURCUMA XANTHORRHIZA ROXB.

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Xanthorrhizol is a major compound from *Curcuma xanthorrhiza* (temulawak) which has potential applications in healthcare, pharmaceutical and cosmecuetical industries. Tissue culture technique has provided alternative method for the production of phytochemicals. The objective of this project is to develop a micropropagation method which is efficient for mass propagation and subsequent production of rhizomes yield comparable to that propagated conventionally from plants of *Curcuma xanthorrhiza* Roxb also known as temulawak. A protocol was developed for in vitro direct regeneration using young vegetative buds from sprouted rhizomes of *Curcuma xanthorrhiza*. Small and active buds of rhizomes were cultured for 4 weeks in murashige and skoog basal medium for shoot initiation. These young shoots were subsequently transferred to maturation solution (MS) medium, supplement with 3.0 mg/L benzyl amino purine, and allowed to multiply for 4 weeks. The shoots were then rooted in MS basal medium augment with activated charcoal and solidified with 2.5 g/L gelrite. The *In vitro* plants were then acclimatized and transferred to the field. After 12 months in the field, various parameters such as number of tillers per plant, shoot length, number of leaves, length and width of leaves and weight of rhizomes were measured. The present study will be continued by comparing the amount of xanthorrhizol from *in vivo* rhizome and sources from in vitro culture as cell or root suspension.

Keywords: Micropropagation, Direct regeneration, Field assessment, Tissue culture, *Curcuma xanthorrhiza*, Temulawak.

PRODUCTION OF XANTHORRHIZOL FROM IN VITRO DERIVED RHIZOME OF CURCUMA XANTHORRHIZA ROXB. FOR PHARMACEUTICAL AND COSMETIC INDUSTRY

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An efficient micropropagation protocol for high yield of rhizomes of *Curcuma xanthorrhiza* Roxb. was developed. *C. xanthorrhiza* is known to produce a number of secondary metabolites with potential applications in healthcare, pharmaceutical and cosmetic industries. Tissue culture technique has enabled the development of an alternative approach for the production of these plant biochemicals of which one such compound is xanthorrhizol.

Using young vegetative buds from sprouted rhizomes of *C. xanthorrhiza*, an *in vitro* direct regeneration protocol was developed. Small and active buds of the rhizomes were cultured on maturation solution (MS) basal medium for shoot initiation over the duration of four (4) weeks. These shoots were subsequently transferred to MS medium supplemented with benzyl amino purine (BAP) and allowed to multiply for six (6) weeks. Shoots were then rooted on MS basal medium augmented with activated charcoal and solidified with gelrite. Following acclimatization, the *in vitro* plants obtained were transferred to the field where key parameters were assessed after twelve (12) months. The data showed that tissue culture derived from plants were more vigorous in their growth, as observed in the higher rhizome yield when compared to conventionally propagated plants. After going through a series of extraction processes namely: the cold soak extraction, hydrodistillation extraction and soxhlet extraction, the tissue culture derived from plants and cultivated rhizomes was analyzed using capillary gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). The results showed that a significant amount of xanthorrhizol was found in all the extracts studied.

Keywords: *Curcuma xanthorhiza, xanthorrhizol,* Cold soak extraction, Hydrodistillation extraction, Soxhlet extraction, GC and GC-MS.

SOMATIC EMBRYOS MATURATION OF HYOSCYAMUS NIGER

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The crucial phase of somatic embryogenesis is the conversion of the globular embryo to the torpedo or heart-shaped stage during maturation. The effects of four different plant growth regulators on the maturation of embryogenic callus of Hyoscyamus niger L. were studied. Embryogenic callus with globular embryos induced from the leaf explant of *H.* niger on murashige and Skoog supplemented with 6.0 mg/L picloram were cultured on maturation solution (MS) basal medium for one week. The culture was then transferred into four maturation media : MS + 1.0 mg/L 6-benzylaminopurine (BA), MS + 1.0 mg/L quintin (King), MS + 1.0 mg/L naphthaleneacetic acid (NAA) and MS + 1.0 mg/L 3-indolebutyric acid (IBA). The results showed that the globular embryos in the embryogenic callus before subculturing increased in size and were easy to be separated when cultured in MS + 1.0 mg/L BA. The globular embryos developed into torpedo, heart shape or bipolar shoot and root after two weeks of culture. An average of 21.8 ± 7.6 globular shaped embryos, 7.1 ± 1.7 torpedo shaped embryos and 4.8 ± 1.7 roots were obtained in this medium which produced the best result for maturation. NAA and IBA imposed similar effect as BA, except that the somatic embryos were difficult to be separated. On the other hand, the use of King in the culture promoted the formation of long roots (1.5 cm) with fine root hairs which negatively affected the germination of somatic embryos.

Keywords: Somatic embryos, Embryogenic callus, *Hyoscyamus niger,* Maturation, Plant growth regulators

NUTRIENT MANAGEMENT FOR CHILI PLANTATION IN SUNGAI BULOH, MALAYSIA USING GOAL PROGRAMMING FORMULATION

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This paper presents a preemptive goal programming model (GP) for multi-objective nutrient management problem by determining the optimum fertilizer combination which is cost effective for chilli plantation in Sungai Buloh Malaysia. Since most of the commercial fertilizers for chilli plants available in the market are very expensive, it is crucial for farmers to apply the minimum amount of fertilizers, yet providing an optimum requirement of nutrients for the normal growth and completion of life cycle of the chilli plants in order to reduce cost. A mixed or complete fertilizer contains nitrogen, phosphorus and potassium (N-P-K). The maximum and minimum requirements of these nutrients recommended for chilli plants by the Agriculture Department are 80–140 kg/ha of N, 75–125 kg/ha of P, and 60–120 kg/ha of K. These data were collected from the Farmer Association of Gombak and Petaling District.

A set of data was used to test the effectiveness and efficiency of the proposed model to obtain the minimum cost of a combination of fertilizers which provides optimum N-P-K using different types of fertilizers. Results derived from this model depict that the fertilizer combination provides nutrient content of 80 kg/ha of nitrogen, 75 kg/ha of phosphorus and 60 kg/ha of potassium with a cost of only RM1,583.1047/ha which is approximately eight times lower than the current cost of RM 7,400/ for fertilizers used in chilli plantation. The advantage of this model is its flexibility in adjusting the goal priorities such as to minimize the total cost in fertilizer combination, maximize utilization of the lower limit of nutrients and minimize over utilization of the upper limit of nutrients in accordance with the importance of each objective.

Keywords: Goal programming, Nutrient management, Fertilizer combination.

PVDF-HFP/PEMA BLEND BASED PROTON CONDUCTING POLYMER ELECTROLYTES

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Blending of polymers is an economical technique to develop new polymeric materials with properties that are superior, intermediate, or just different from those of individual component polymers. Polymer blends have received great interest in recent years due to its advantages including simplicity of preparation. An additional advantage is ease of control of properties by changing the component polymers and their compositions. It has been reported that polymer electrolytes developed using polymer blends exhibited higher conductivity and better mechanical strength compared to the electrolytes based on single polymer.

In this study, flexible free standing film of Poly (vinylidene fluoride-co-hexafluoropropylene) (PVDF-HFP)/Polyethyl methacrylate (PEMA)/ammonium triflate ($NH_4CF_3SO_3$) electrolyte systems have been successfully prepared using solution casting technique. The prepared films were characterized using X-ray diffraction (XRD), differential scanning calorimetry (DSC), impedance spectroscopy and ionic transference number measurements in order to investigate their structural, thermal, electrical and electrochemical properties, respectively. The XRD, SEM, DSC and dielectric constant studies showed that the conductivity of the films was influenced by the relative percentage of crystallinity and charge carrier concentration. The conductivity was observed to increase with increasing ammonium triflate concentration. The film of electrolyte containing 40 wt % of salt exhibited optimum room temperature conductivity of 7.07×10^{-4} S cm^{-1}. The increase in the conductivity is attributed to the increase in the number of ions as the salt concentration is increased. This has been proven by dielectric studies. The value of dielectric constants, εr, for every frequency was observed to increase with $NH_4CF_3SO_3$ salt concentration from 5 to 40 wt %. The increase in εr with salt concentration gives a reflection of an increase in the number of charge carriers with the increase in the salt concentration. The decrease in the value of εr with salt concentration above 40 wt % is attributed to the association of ions forming ion-pairs. The increase in conductivity is also partly due to the increase in the fraction of amorphous region in the electrolyte films as confirmed by XRD and DSC results.

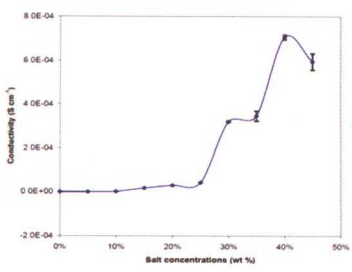

Figure 1 :
Conductivity of PVDF-HFP/PEMA/ $NH_4CF_3SO_3$ versus $NH_4CF_3SO_3$ concentration.

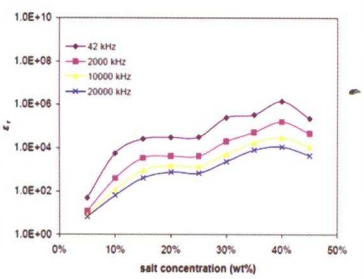

Figure 2 :
Dielectric constant versus salt concentration at various frequencies for PVDF-HFP/PEMA/$NH_4CF_3SO_3$ system

Keywords: Polymer, Electrolyte, Crystallinity, Amorphous

THE EFFECT OF POROSITY ON GaN FOR HYDROGEN GAS SENSING

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Porous wide bandgap semiconductors have been widely studied in the last decade due to their unique properties compared to the bulk crystals. The high surface area, shift of bandgap, luminescence intensity enhancement and efficient photoresponse when porosity is formed can be tailored to fabricate new sensing devices.

The samples used in this study were commercial n-GaN grown on sapphire (Al_2O_3) substrates. The samples were initially cleaned in 1:20 $NH_4OH:H_2O$, followed by second cleaning in 1:50 $HF:H_2O$ and final cleaning in 3:1 HCl: HNO_3. The sample with Pt contact sputtered was immersed into a solution of $CH_3OH:HF:H_2O_2$ in a ratio of 1:4:1 under UV illumination for electroless chemical etching. For Schottky contact, palladium was sputtered and aluminium was evaporated from the surface.

The structural properties of the porous GaN samples were investigated by scanning electron microscopy (SEM) and Atomic Force Microscopy (AFM). Current-voltage (I-V) measurements were performed to monitor the change in the gas sensor samples with and without gas exposure. Hydrogen sensor was subsequently fabricated by depositing Pt Schottky contact onto the porous GaN sample. The hydrogen gas used to investigate the effect of porosity is a mixture of hydrogen gas and nitrogen gas, where one of the compositions was 1% H_2 and 99% N_2 and the other composition was 2% H_2 and 98% N_2 .The current–voltage (I-V) characteristic data was used to calculate the Shottky barrier height value for both the as-grown and porous sample before and after exposing to hydrogen gas. Hydrogen gas affects the dipole layer at the Pd-GaN interface because of their reactivity. The positive hydrogen concentration dependence for both the as grown and porous samples as shown in Figure 1 can be attributed to the increased collision among hydrogen atoms that induces a higher reaction rate. In addition, Figure 1 depicts that the as-grown GaN sample exhibits a more drastic difference than the porous GaN sample upon exposure to the 1% and 2% hydrogen gas ambient. From the graph in Figure 1, it can be concluded that the as-grown GaN sample has higher sensitivity than the porous GaN sample.

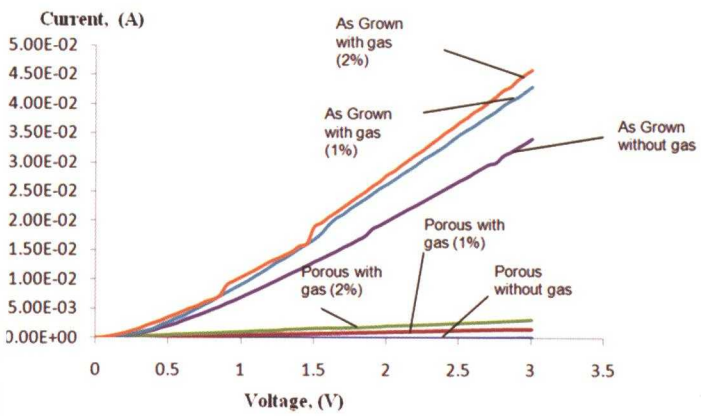

Figure 1. Comparison of as grown GaN sample and porous GaN without gas and with 1% and 2% H_2 gas response curve.

Keywords: Porous GaN, Pd Schottky contact, Gas Sensing, Electroless Chemical Etching

A STUDY OF STRUCTURAL AND ELECTRICAL PROPERTIES OF $LiNi_{0.5}Mg_{0.5}VO_4$ CATHODE MATERIAL FOR LITHIUM-ION BATTERIES

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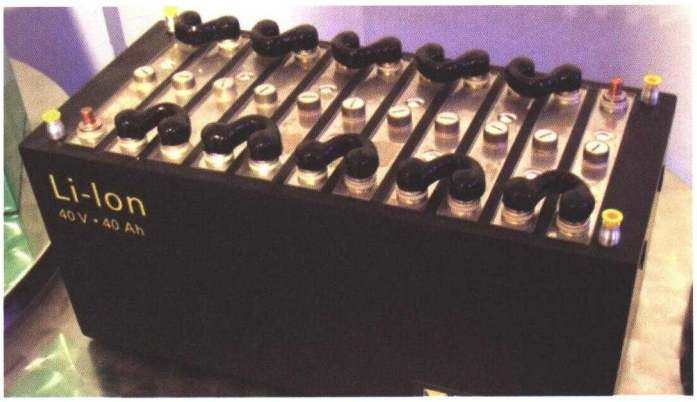
Lithium – ion battery is a well-known rechargeable battery type that is commonly used in portable electronic devices. There are three components in a battery namely, cathode, anode and electrolyte. In this work, cathode material of $LiNi_{0.5}Mg_{0.5}VO_4$ was synthesized in a pure state by an organic synthetic procedure known as the sol-gel method. Tartaric acid was used as the complexing agent. Thermogravimetry analysis (TGA) was applied to determine the temperature range for the annealing process without oxidative degradation of the precursor sample. The temperatures of 450 °C and 550 °C were chosen to be the annealing temperature for the study and the annealing time was fixed at 5 hours. The structural properties of the samples annealed at 450 and 550 °C were characterized by X-ray diffraction (XRD) using X'PERT PRO MRD XL analytical. XRD result as shown in Figure 1 reveals that both the $LiNi_{0.5}Mg_{0.5}VO_4$ samples possess crystalline phases but the crystallinity of the one annealed at 450 °C is higher as compared to that annealed at 550 °C.



Electrochemical characterization was carried out using Solartron Impedance Spectroscopy. Bulk resistance (RB) of $LiNi_{0.5}Mg_{0.5}VO_4$ annealed at 450 °C and 550 °C was measured at 25, 35, 45, 55 and 65 °C. Ionic conductivity (σ) of the sample was then calculated by using the formula, where *t* is the thickness of the film $\frac{t}{R_B A}$ and A is the surface area of the electrode on which the film was placed. Figure 2 depicts that the σ values of both the samples decrease with ascending temperature. Meanwhile, it is observed in Figure 2 that the ionic conductivity at all temperatures for $LiNi_{0.5}Mg_{0.5}VO_4$ annealed at 450°C is slightly higher than that annealed at 550 °C. Therefore, 450 °C is the optimum annealing temperature for the preparation of cathode material of $LiNi_{0.5}Mg_{0.5}VO_4$ for future studies.

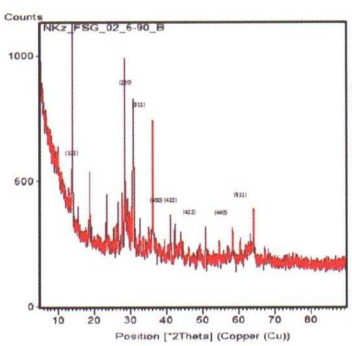


Figure 1.
XRD pattern of $LiNi_{0.5}Mg_{0.5}VO_4$ annealed at 450 °C for 5 hours.

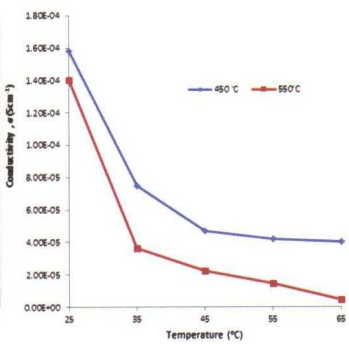


Figure 2.
Temperature dependence on conductivity for $LiNi_{0.5}Mg_{0.5}VO_4$ annealed at 450 °C and 550 °C

Keywords: $LiNi_{0.5}Mg_{0.5}VO_4$, Li-ion battery, Cathode material, Annealing temperature.

EFFECT OF DYE COATING DURATION OF EOSIN Y TOWARD HYBRID SOLAR CELL

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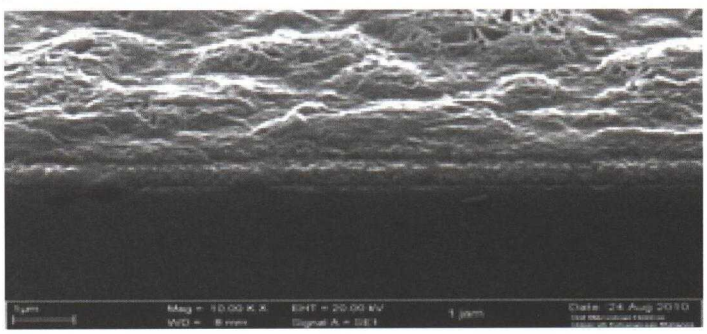
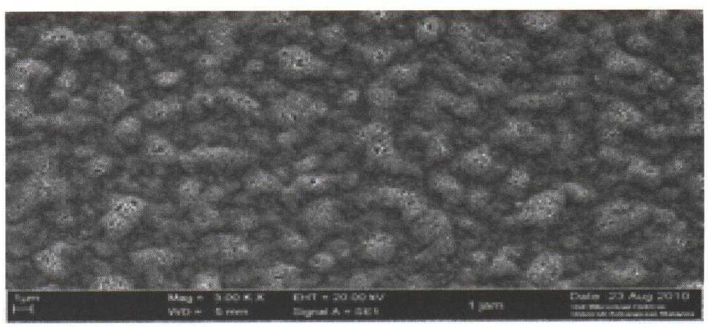
Nowadays, demand for alternative energy production becomes more popular especially for energy resources because of the environmental awareness due to climate change. One of the alternative energy resources is solar energy, like solar cell. This energy source is reckoned to be safe and clean. The common types of solar cells are based on inorganic materials such as silicon. These conventional solar cells are made from inorganic materials, using expensive materials of high purity and energy intensive processing techniques.

This research is centered around the development of a new technique to fabricate low-cost processable hybrid solar cell that has significant advantage in terms of its ability of power conversion efficiency. Hybrid solar cell composed of a dyed oxide semiconductor is proved to be one of the most low-cost alternatives for the effective conversion of light energy to electrical energy. Our study focuses on the effect of eosin Y toward the performance of hybrid solar cell at different dye-coating durations. The structure of our inverted organic solar cell is FTO/ZnO/MEHPPV:PCBM/Au. Eosin Y is an organic dye that is applied in photovoltaic power conversion and semiconductor, ZnO. ZnO film responds well when synthesized by eosin Y.

The ZnO nanorods-coated FTO substrates were immersed in the eosin Y dye solution with ethanol at 60 °C for 15, 60 and 120 minutes. The characterization of the morphology of the sample was done by Scanning Electron Microscope (SEM). UV-Vis-NIR test for optical properties and current voltage test (IV) to determine the cell efficiency were conducted. The power conversion efficiency of the solar cell increased with dye coating duration and reached an optimum value at dye coating duration of 60 minutes. The device using dye coating duration of 60 minutes exhibited the highest power conversion efficiency of 0.0001528 %.



(a)



(b)

Figure 1. (a) Cross-section and (b) top-view of SEM images for ZnO nanorods with dye-coating duration of 60 minutes.

Keywords: Hybrid solar cell, ZnO, Eosin Y

NEW POLYMER BASED ULTRASOUND PHANTOM FOR LIVER SCREENING

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The manufactured test phantoms usually are more expensive and fragile. Fungi tend to grow on some water-based phantoms and/or may shrink over time thereby rendering them not suitable for use for imaging purposes. In addition, the fabrication process for tissue mimicking material such as polyvinyl alcohol (PVA) is time consuming. A polymer-based phantom consisting of different compositions of the monomer, hydroxyethyl acrylate (HEA), is developed for use in ultrasound liver screening. The phantom is characterized using ultrasound frequencies of 2.25, 5.0, and 10.0 MHz. An overview of the research methodology sequence is illustrated in Figure 1.

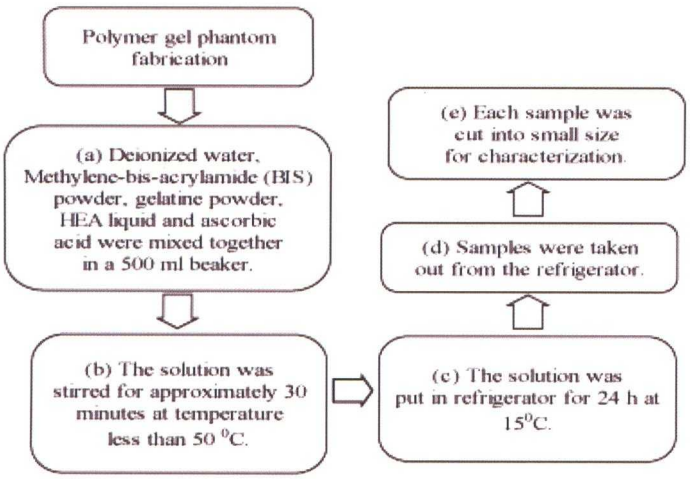
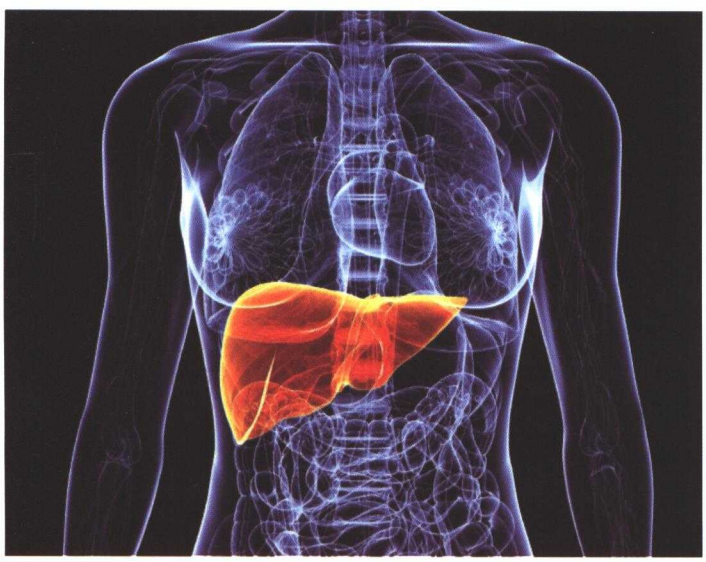


Figure 1: Methodology Sequence

The characterization result shows that only the phantom gel consisting of 5 % HEA is the most suitable for the screening of human liver tissue with a density of 1066.67 kg/m^3, whereas phantom gel with 5 or 10 % HEA attains the speed of sound that is closest to that in human liver. This new technique is not only cost effective, but also produces polymer gel phantom with longer life span and resistant to fungal growth. However, the new phantom produced is a tough solid which absorbs water easily when immersed in water for about 20 minutes.

Keywords: Polymer phantom, Tissue-mimicking, Liver screening, Ultrasound



ELECTRICAL CHARACTERIZATION OF HEXANOYL CHITOSAN-BASED POLYMER ELECTROLYTES

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In recent years, solid polymer electrolytes (SPEs) have drawn keen interest due to their wide application especially in secondary lithium batteries as they offer good mechanical properties and good contact with electrode materials. Addition of plasticizer is one of the approaches widely adopted to enhance the conductivity of polymer-salt complexes. The roles of plasticizer as the conductivity enhancer are: helping the dissociation of salt; enhancing the ions mobility by maintaining a liquid like state within the polymer matrix and reducing crystalline fraction of the polymer. In this paper, we report the effect of DMC in changing the crystalline nature of hexanoyl chitosan-LiClO4-TiO2 electrolyte system. The role of DMC on the transport properties of the prepared electrolyte system has also been investigated.

Hexanoyl chitosan-based polymer electrolytes were prepared using the solution casting technique. The effect of dimethyl carbonate (DMC) plasticizer on the structural and electrical properties of the prepared electrolyte system was investigated by X-ray diffraction and impedance spectroscopy, respectively. Upon addition of 15 wt % of DMC, the ionic conductivity was increased to 4.09 x 10^{-4} S cm^{-1} from 3.06 x 10^{-4} S cm^{-1} as shown in Figure 1. The XRD results revealed the variation in conductivity from the structural aspect. For example, sample with lower crystallinity exhibits higher conductivity which can be observed in Figure 2. The Rice and Roth model was employed to understand the variation in conductivity on the basis of number and mobility of free ions. It is shown that the increase in conductivity is due to the decrease in crystallinity and increase in the number and mobility of free ions.

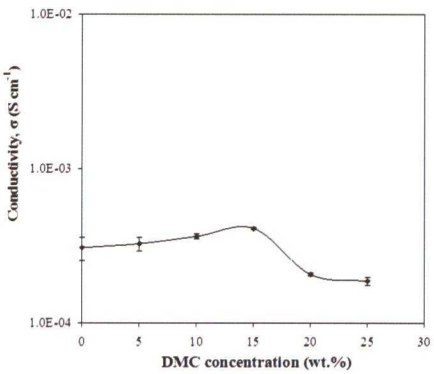

Figure 1. Dependence of room temperature conductivity on DMC concentration.

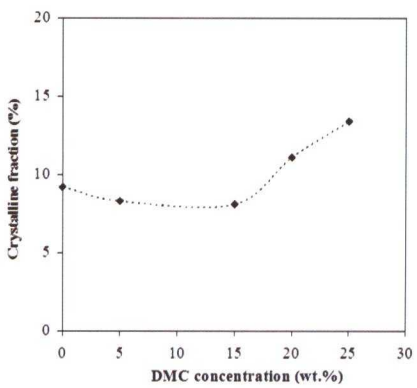

Figure 2. Variation in crystalline fraction for hexanoyl chitosan-$LiClO_4$-TiO_2 as a function of DMC concentration.

Keywords: Hexanoyl Chitosan, TiO_2, DMC, XRD, Rice and Roth Model

THERMAL AND CONDUCTIVITY PROPERTIES OF POLY(ETHYLENE OXIDE)/ POLYACRYLATE BLEND WITH LITHIUM PERCHLORATE

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Over the last three decades, poly(ethylene oxide) (PEO) remains to be the focus in most of the researches on solid state batteries because of its strong solvating capability of wide variety of inorganic salt and its low glass transition temperature (*Tg*) [1-2]. Chan and Kammer [3] in their study on the ionic conductivity of the immiscible PEO/ epoxidized natural rubber (ENR) blend demonstrates that Li^+ ion has a higher solubility in the amorphous phase of PEO as compared to ENR. Therefore, the amorphous phase of PEO becomes the conductivity pathway for ion-transport in the blend.

Solution casting technique was employed to prepare the poly(ethylene oxide) (PEO)/ polyacrylate (PAc) blends. Thermal behaviour and ionic conductivity of the PEO/PAc and PEO/PAc blends added with $LiClO_4$ were investigated using differential scanning calorimetry (DSC) and impedance spectroscopy (IS), respectively. Miscibility of the blend is affirmed by the observation of a single composition-dependent glass transition temperature (*Tg*) which agrees closely with that calculated using the Fox equation as shown in Figure 1. The Fox equation is defined as $\frac{1}{T_g} = \frac{W_1}{T_{g1}} + \frac{W_2}{T_{g2}}$ where W_1, Tg_1 and W_2, T_{g2} refer to the weight fractions and T_gs of PEO and PAc, respectively. Besides, the successive suppression of the melting temperature (T_m) and crystallinity of PEO with ascending PAc content also reflect the miscibility of the two constituents in the blend.

The conductivity of salt-free PEO is enhanced with the addition of ≤ 25 wt% of PAc due to the reduced crystallinity of PEO in the blend. The T_g values of the blend at all compositions under study increase with the addition of $LiClO_4$. Ionic conductivity of the salt-added blend increases with increasing salt concentration. The amorphous phase of PEO forms the percolating pathway in the homogeneous PEO/PAc/$LiClO_4$ blends as blends with PEO content ≥ 25 wt% (PEO/PAc 75/25 blend) records slightly higher σ values than PEO/$LiClO_4$ at $LiClO_4$ concentration $Y > 0.02$ as shown in Figure 2. Enhancement in ionic conductivity in the blend is probably the result of increase charge carrier density and ionic dynamic of the PEO macromolecular chain.

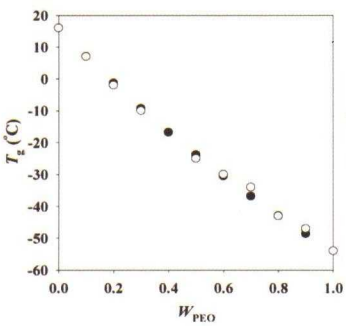

Figure 1. Plots of Tg of PEO/PAc blend versus weight fractions of PEO (W_{PEO}). Symbols (•) and (○) denote experimental value and values calculated from Fox equation, respectively.

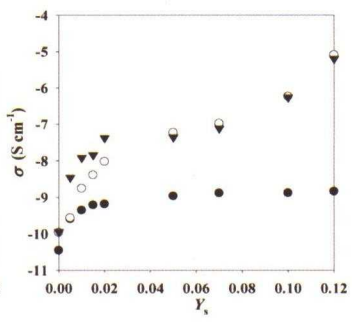

Figure 2. Semilogarithm plots σ versus Y_s for (•) neat PAc, (o) PEO/PAc 75/25 blend, and (▼) neat PEO

Keywords: Polymer Electrolyte, Conductivity, Glass Transition Temperature.

References

[1] Rhodes C.P., Frech R., Macromolecules, 34, 2660-2666 (2001).
[2] Gitelman L., Israeli M., Averbuch A., Nathan M., Schuss Z., Golodnitsky D. Journal of Computational Physics, 227, 1162-1175, (2007).
[3] Chan C.H., Kammer H.W. Journal of Applied Polymer Science, 110, 424-432, (2008).

SYNTHESIS OF MONOACYLGLYCEROL FROM COCONUT OIL BY ENZYME-CATALYZED REACTION

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Monoacylglycerol (MAG) is the most widely used emulsifier in the food, pharmaceutics and cosmetic industries. It was commonly synthesized, in the past, by esterification/ glycerolysis reaction using strong acids or strong bases such as sulfuric acid or sodium hydroxide, respectively as catalyst. However, these strong acids and bases are corrosive; therefore, enzyme-catalyzed esterification is a safer and environmental friendly alternative in producing MAG.

In this work, MAG is synthesized from coconut oil by enzymatic glycerolysis reaction. Characterization of coconut oil found that the acidity value, peroxide value, iodine value; saponification and moisture content were respectively 0.56±0.1 mg KOH g^{-1}, 12.66 ±1.3 meq/g, 8.5±0.3 I_2/100 g, 254 mg KOH g^{-1} and 0.23%. Gas chromatography result on the fatty acids composition in coconut oil shows that it consists of 91.8 % saturated fatty acids viz caproic (C6:0), caprylic (C8:0), capric (C10:0), lauric (C12:0), myrystric (C14:0), palmitic (C16:0) and stearic acids (C18:0). The remaining 8.2 % are unsaturated fatty acids namely oleic (C18:1) and linoleic (C18:2) acids.

Glycerolysis reaction to produce MAG is carried out between coconut oil and glycerol in an optimum molar ratio of 1:2.7. Lipase Candida Antartica enzyme (Novozyme 435) which acts as the catalyst, was added to coconut oil and glycerol and the reaction mixture was thoroughly mixed using an orbital shaker operated at 200 rpm at a controlled temperature of 60 °C for six hours. The product obtained is a pale yellow liquid which is confirmed to be MAG through spectroscopic analysis using fourier transform infrared (FT-IR) and nuclear magnetic resonance (NMR). MAG exhibits a hydrophylic-lipophylic balance (HLB) value of 11 indicating that it is an O/W (oil-in-water) emulsion which means the oil is the dispersed phase, and water is the dispersion medium. The present work can be extended by determining the kinetic energy of the reaction process using different experimental parameters such as temperature and mole ratio of coconut oil: glycerol and to compare the experimental and theoretical results using the Gaussian software. Gaussian software is a computer program for computational chemistry that has been widely applied in molecular mechanics and quantum chemistry.

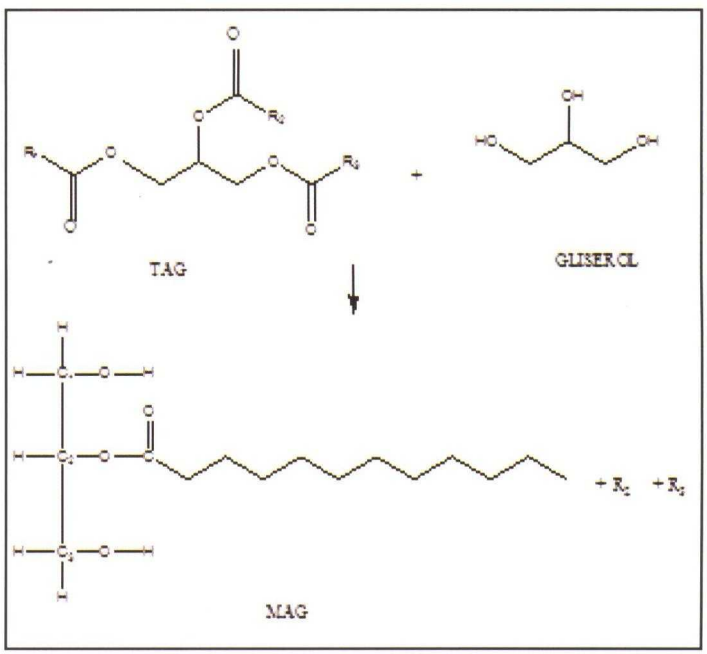

Figure 1. Glycerolysis reaction of coconut oil with glycerol

Keywords: Monoacylgycerol, Lipase, Glycerolysis

WAX ESTERS AS CLASSICAL OIL SUBSTITUTE EMOLLIENT FOR COSMETIC APPLICATION

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Plant oils and animal fats were the earliest natural emollients used in the history of cosmetic industry. These classical emollients not only provide moisturizing effect to the skin but also serve as carriers for other agents in cosmetic formulations. However, the presence of triglyceride, a major component of natural oils and fats, causes the classical emollient to impart a heavy and greasy after-use feel and have low absorbance and penetration into the skin. On the other hand, wax ester (WE) which is a derivative of oil is a long chain ester made up of fatty acids and alcohols. In addition, these wax esters have non-toxic properties and excellent wetting behavior at the interface, thus, fulfilling the requirements of oil substituted emollient.

In this work, wax esters were produced via lipase-catalyzed alcoholysis reaction between various types of vegetable oils and alcohols. This method was chosen over the conventional method (using chemical catalyst) largely due to the specificity and selectivity of the enzyme towards the formation of the desired product. Besides, it is a 'greener' process as it requires less energy consumption and operates at mild reaction condition using non-hazardous chemicals. In the synthesis of WE, a statistical based technique known as the response surface methodology (RSM) was adopted to optimize the experimental conditions so as to ensure a good yield of WE. The effects of the various experimental conditions on the yield of the WE can be studied simultaneously by applying the RSM model, thus, reducing the time and the cost of the production process. The result reveals that a high yield (>85%) of WE is obtained when an optimum substrate molar ratio of 1:3 mmol of oil: alcohol is allowed to react at a temperature range of 50-60°C for 3-5 h.

The potentiality of the WE as a marketable emollient which does not cause irritation but has moisturizing effect to human skin, is evaluated using the irritancy and moisturizing efficacy test. The WE synthesized is proven to be non-irritable, hydrating and able to maintain the emolliency with non-oily feeling after application. Therefore, it is a desirable ingredient for industrial use especially in cosmetic formulation.

Keywords: Wax Esters (WE), Lipase-catalyzed Alcoholysis Reaction.

FUTURE NANOTECHNOLOGY FROM MALAYSIAN PALM OIL

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Carbon nanotubes (CNTs), the microscopic tubes of rolled up carbon atoms has attracted much attention as a key component in nanotechnology since their discovery in 1991. Research in CNTs has grown tremendously in the last decade due to their unique properties and wide applications such as in solar cells, microelectronics and transistors. Low-cost alternative carbon sources have been investigated due to the increasing demand for large scale production of CNTs. Sadeghian (2009) reported the production of large-scale and low-cost CNTs from hexane [1]. Shirazi et al, (2011) utilizes cyclohexanol and xylene as carbon sources and reveals that the oxygen atom in cyclohexanol reduces the amorphous carbon and metallic catalyst (impurities) in CNTs [2]. However, natural carbon source has emerged to be a better alternative because it provides a "green" substitute as cheap, non-hazardous and renewable raw material.

In this work, palm oil and its derivative, dihydroxystearic acid (DHSA) were used as the "green" carbon sources. The effect of different carbon sources on the quality and yield of the CNT is also investigated. It is well documented that the presence of controlled amount of oxygen in the carbon source provides a cleansing effect by preventing the formation of amorphous carbon [3]. The mechanism in the growth process of a CNT involves the formation of OH radical from the reaction between atomic C and H radical at high temperature. The OH radical which acts as a strong etchant, suppresses the super saturation of carbon molecules, hence, removes the amorphous carbon and the defective carbon structures. On examining the molecular formulae of palm oil ($C_{55}H_{96}O_6$) and DHSA ($C_{18}H_{36}O_4$), palm oil is predicted to have a higher cleaning effect due to its higher oxygen content per molecule as compared to DHSA. This prediction is confirmed as the experimental result shown in Figure 1 reveals the production of higher yield of CNTs with less impurities using palm oil as the carbon source as compared to those produced using DHSA as carbon source. Based on our findings, CNTs produced from palm DHSA consist of the remaining metallic catalyst particle and the amorphous carbon which does not form CNTs as shown by the arrows in Figure 1 (b).

In conclusion, it is highly recommended to use natural and renewable carbon source for the production of CNTs because it not only gives reasonable yield but also is environmental friendly. Palm oil has been proven in this study to be a good natural carbon source due to its high carbon supply and high cleansing effect.

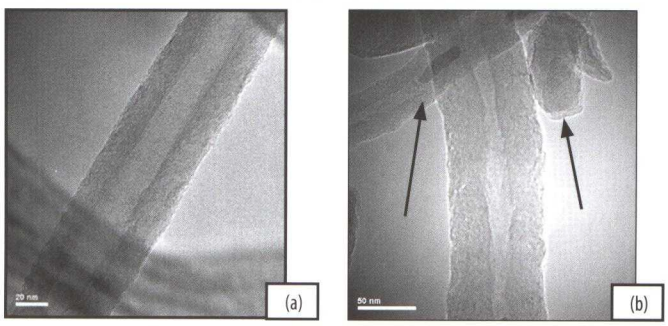

Figure 1. Transmission Electron Microscopy image of CNTs produced from (a) palm oil and (b) palm DHSA. The impurities and the amorphous carbon are displayed by the arrows in (b)

Keywords: Carbon Nanotubes, Palm Oil, Palm DHSA

References

[1] Sadeghian Z. Large-scale production of multi-walled carbon nanotubes by low-cost spray pyrolysis of hexane [J]. New Carbon Material, 2009, 24 (1) : 33-38.
[2] Yaser Shirazi, Maryam Ahmadzadeh Tofighy, Toraj Mohammadi, Afshin Pak. Effects of different carbon precursors on synthesis of multiwall carbon nanotubes: Purification and Functionalization. Applied Surface Science, 2011, 257: 7359-7367.
[3] O'Connell, M. J. (2006). Carbon Nanotubes Properties and Applications. New York: CRC Press.

POLYMERIC MATERIALS FROM PALM OIL PRODUCTS

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Recent development and commercialization of bio-based products such as corn and palm oil reduces the extensive dependence on the exhaustible fossil fuel [1]. In addition, it provides a significant economic impact to Malaysia as the world's largest producer and exporter of palm oil. Epoxidised palm oil (EPO) products have been reported to yield materials suitable to be used as plasticizer and stabilizer for plastics [2].

The objective of this study is to compare the homogeneity of the nanocomposite prepared using untreated and organically modified nano-sized montmorillonite (MMT) or clay fillers. MMT was organically modified using a mixture of octadecylamine (ODA) and triethylenetetramine (TETA). The polymer used was EPO provided by Malaysia Palm Oil Board (MPOB) and TETA was applied as the amine based curing agent in this work. Two samples of bio-based polymer nanocomposites were separately prepared by mixing EPO and TETA with untreated and treated MMT. The characteristic peaks assigned to the functional groups of EPO, TETA and the untreated and modified MMT were observed in the Fourier transform infrared (FTIR) spectra of the two different nanocomposites synthesized, thus, confirming the structures of the nanocomposites. The optimum amount of the EPO, curing agent and MMT mixture were found to be 10 g of EPO with 16.67 wt% of curing agent and 10 parts MMT per hundred polymer.

X-Ray Diffractometer (XRD) spectrum depicts that the d001 peak of the nanocomposite with modified MMT shifts to a lower angle and the layer spacing of the clay galleries is increased by 2 nm indicating that an intercalated structure of the composite is produced. Intercalated nanocomposites are formed when one or few molecular layers of the polymer are inserted into the clay galleries with fixed interlayer spacing. In addition, Scanning Electron Microscope (SEM) micrograph displays a homogeneous dispersion of the clay particles in the organic medium. This suggests that the organically modified nano-clay fillers are more organophilic as compared to the untreated MMT which is normally hydrophilic. The organophilic property allows the treated MMT to have a better dispersion in the matrix of the composites, and hence, enhances the homogeneity of the nanocomposite.

Keywords: Epoxidised Palm Oil, Triethylenetetramine, Montmorillonite

References

[1] Miyagawa, H., Misra, M., Drzal, L.T. and Mohanty, A.K. 2005. Biobased Epoxy/*Layered Silicate Nanocomposites*: Thermophysical Properties and Fracture Behavior Evaluation. *Journal of Polymers and the Environment* 13:87-96.
[2] Ahmad, S., Rafie, A. and Ismail, Z. August 1987. PORIM Report PO (125a) 87, General.

PROPERTIES OF EPOXIDISED NATURAL RUBBER-BASED POLYMER ELECTROLYTE

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Epoxidized natural rubber (ENR) as shown in Figure 1 is derived from natural rubber by converting different percent of the C=C bonds on the macromolecular backbone to the polar epoxy groups. ENR has good potential to be polymer host in solid polymer electrolyte (SPE) because of their distinctive characteristic such as low glass transition temperature (T_g), elastomeric characteristics at room temperature [1] and good electrode-electrolyte adhesion. Furthermore, the polar epoxy oxygen atoms in ENR provide coordination sites for Li^+ ion transport [2,3].

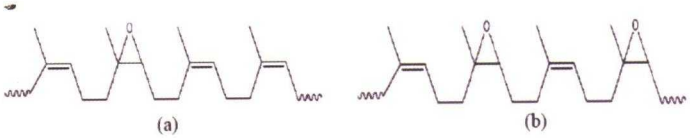
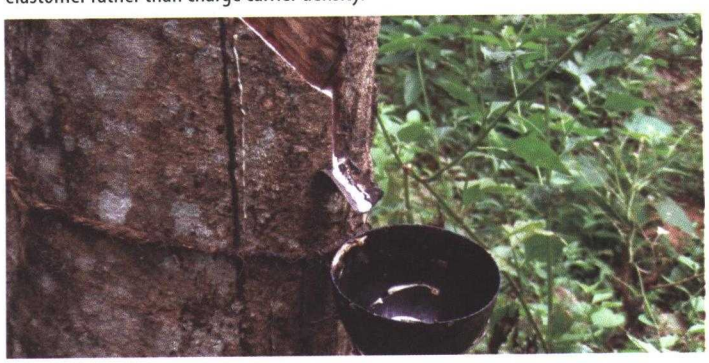


Figure 1. Chemical structures of (a) ENR-25, (b) ENR-50.

Solid solutions of ENR with 25 and 50 mol % epoxidation, ENR-25 and ENR-50, respectively, added with LiClO4 were prepared by solution casting technique. T_g values obtained using differential scanning calorimetry (DSC) and the ionic conductivity evaluated from bulk resistance (R_b) determined using the impedance spectroscopy point towards higher solubility of the lithium salt in ENR-50 when the ratio of the mass of salt to the mass of polymer (Y) < 0.20. This ramification correlates with Fourier transform infrared (FTIR) spectroscopic results which demonstrate stronger ion-dipole interaction between the Li^+ ion and the epoxide oxygen in ENR-50 as compared to that in ENR-25.

Ionic conductivity (σ) is observed to increase with ascending values of Y. When $Y <$ 0.20, ENR-50 exhibits higher ionic conductivity but the σ values of ENR-25 increase sharply with increasing salt content to above that of ENR-50 when $Y \geq 0.20$. A maximum σ value of 3.7×10^{-8} S cm^{-1} is recorded for ENR-50 at $Y = 0.12$ whereas ENR-25 has a maximum σ value of 5.7×10^{-7} S cm^{-1} at $Y = 0.20$. Higher ion mobility, better salt molecule-chain segment correlation and higher charge carrier diffusion rate account for the higher σ value for ENR-50 at $0.00 < Y < 0.20$. However, restricted ion transport for ENR-50 and relatively flexible segmental motion for ENR-25 at $Y \geq 0.20$ cause the ionic conductivity of ENR-25 to be higher than that of ENR-50. Therefore, ionic conductivity of ENR is primarily governed by the segmental motion of the elastomer rather than charge carrier density.



Keywords: Polymer Electrolytes, Ionic Conductivity, Epoxidized Natural Rubber (ENR)

References

[1] F. Latif, M. Aziz, A. M. M. Ali, and M. Z. A. Yahya, *Macromolecular Symposia*, vol. 277, pp. 62-68, 2009.
[2] R. Idris, M. D. Glasse, R. J. Latham, R. G. Linford, and W. S. Schlindwein, *Journal of Power Sources*, vol. 94, pp. 206-211, 2001.
[3] M. L. Hallensleben, H. R. Schmidt, and R. H. Schuster, *Die Angewandte Makromolekulare Chemie*, vol. 227, pp. 87-99, 1995.

INTERNET USAGE BETWEEN GENDER AMONG PRE-DEGREE STUDENT IN UITM PUNCAK ALAM

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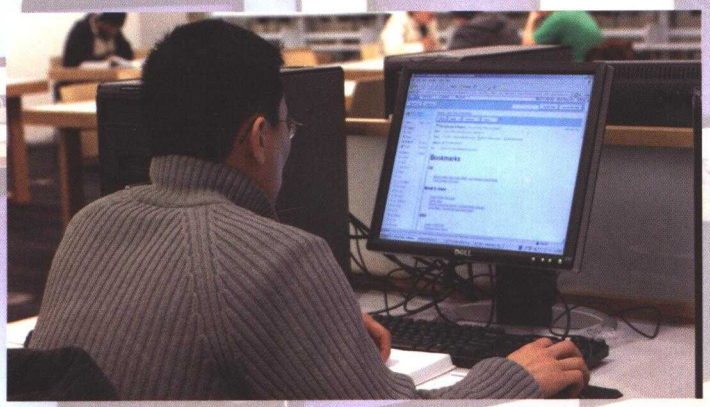
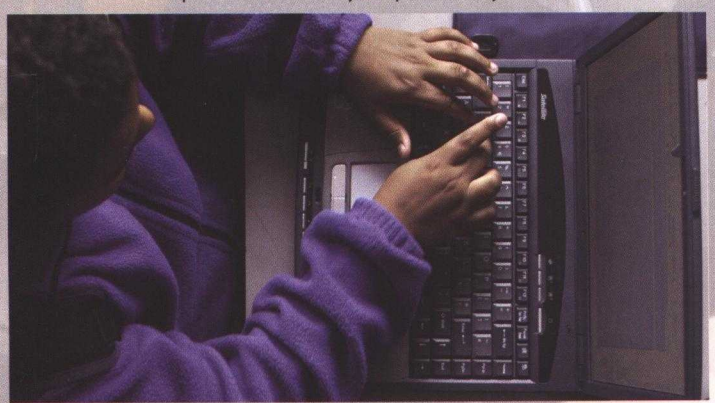
Nowadays, Internet plays an important role in individual daily life. Advancement in technology has provided opportunity to the student in their learning process. Through this paper, the level of Internet and Internet usage towards academic and nonacademic activities between female and male students were analyzed. Survey has been conducted towards 394 students from the Center of Foundation Studies, Puncak Alam comprised of 245 female and 149 male students which are randomly selected. The questionnaire was adopted from Internet Addiction Test (IAT) question by Young (1998) in order to measure the level of Internet and several questions from previous studies to measure on Internet usage towards academic and nonacademic activities. According to Young (1998), level of Internet usage has been categorized into three which are mild, moderate and severe user.



Findings show that 55% of female students were categorized as mild Internet user indicating that they were average online users. This type of user is able to control over the Internet usage. As compared to male students, 53% of them were categorized as moderate Internet users. This category of user is considered as frequently online and Internet does bring full impact to his/her daily life. Meanwhile, result shows that 62% of Internet usage among female students was for academic and 38% for nonacademic activities. However, for male students, the result was dissimilar where 33% was for academic and 67% for nonacademic purposes.

In conclusion, the level of Internet usage for pre-degree student falls between mild and moderate users. The majority of female students are average online users and most of them use it for academic activities; whereas, the majority of male students are frequently online users and most of them use the Internet for nonacademic purposes. However, our study mainly focuses on UiTM Puncak Alam students. Therefore, this study can be extended to all foundation studies throughtout Malaysia. The result will then become more representative of Malaysian preuniversity students.



Keywords: Internet Level, Academic, Nonacademic, Pre-degree Student, Gender

LEARNING INTRODUCTORY C PROGRAMMING: RELEVANT EXERCISES BASED ON STUDENT DIFFICULTIES FACTORS

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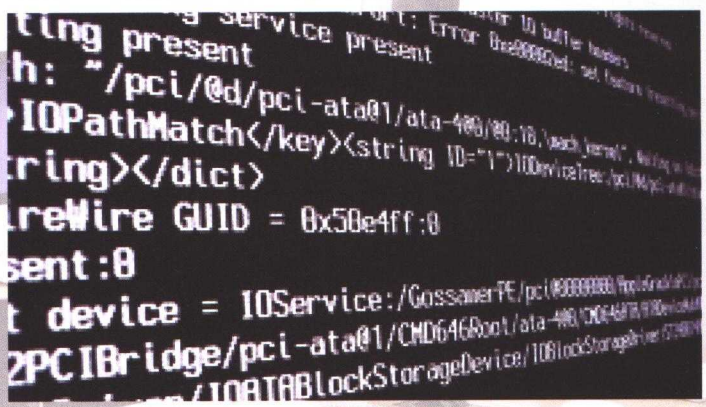
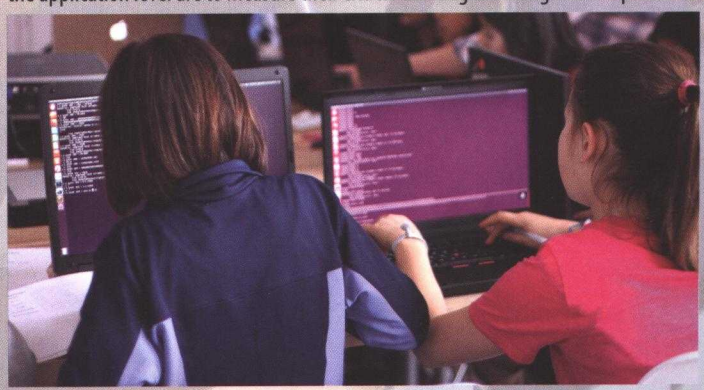
A program is a list of instructions for a computer to follow and it takes six steps to write a good program. C programming is a core subject for foundation engineering in UiTM, Puncak Alam. Past assessments and random interviews showed that most students faced difficulty in understanding the concept of C programming. Therefore, the objective of this study is to identify the level of problem solving and logical thinking skills of the students and it aims to design a set of C programming exercises according to the students' level of understanding and capability .



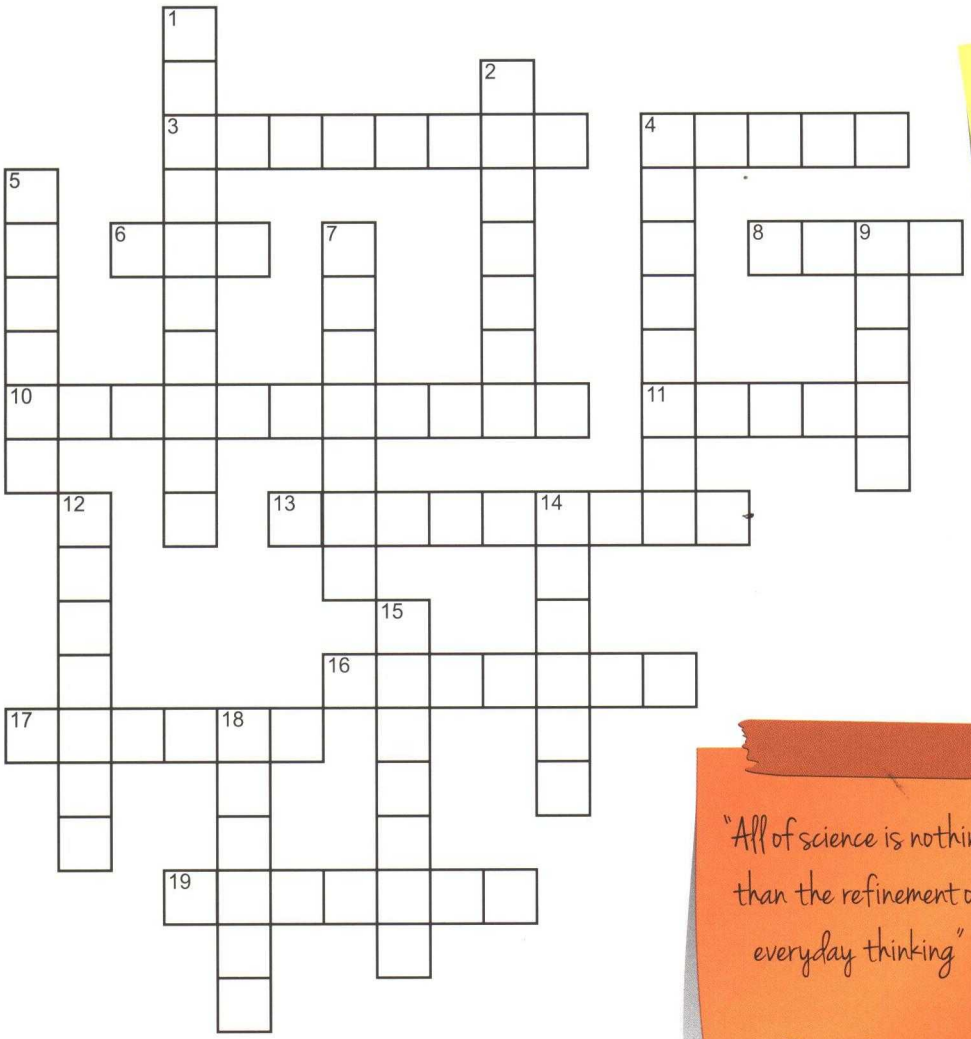
A quantitative research was carried out where as many as 343 students were involved in answering a set of questionnaire consisting of mathematics questions which were believed to be able to measure the level of students' thinking skills. The result showed that the foundation engineering students were good in problem solving skill but lacking in logical thinking skill. Based on the research outcome, a set of exercises was designed by implementing Bloom's Taxonomy in which the level of difficulty of the questions was in the ratio of 2:5:3, that is easy: moderate: difficult. The two easy questions from the memory level are considered to be minimum, just to assess the students' basic knowledge on C programming. Five moderate questions from the understanding level are enough to assess the students' ability to think and solve the problem because majority of the students are at that level. Meanwhile, three challenging questions from the application level are to measure their critical thinking in solving real-life problem.



The significance of this research is to provide a guideline for other lecturers to design tutorial, test and examination questions in accordance with the students' capabillity and thinking skill. Besides these, other factors such as teaching approach, students' attitude etc can be studied in detail to help the students to master C programming. In conclusion, a good educator must identify the students' needs and capability before he/she can effectively guide them during the learning process.

Keywords : C Programming, Difficult to learn C Programming, Engineering Foundation Students, Problem Solving Skills, Logical Skills, Cognitive Skills.

Crossword Puzzle & Quotes



ScienceCrossword.com
Just because you can name something does not mean you know everything about it. - Joe Kotlinski

Across

3. A very small piece of matter.
4. Something that has a shape and is not a gas or liquid.
6. Tiny droplets of water floating in the air near the ground
8. A metal that can be magnetized.
10. A form of energy carried by the flow of electrons.
11. A sharp, curved claw on the foot of a bird.
13. Use this water to clean dirty clothes.
16. An instrument that tells you which direction is North.
17. Caterpillars are in this when they change into a butterfly.
19. This is made of carbon and is the hardest substance on Earth

Down

1. A very large dinosour with a very long neck and tail.
2. A large, meat eating reptile.
4. The framework of bones that carry the weight of the body.
5. This is a colorless gas that animals need to live.
7. This is the largest planet in our solar system.
9. The gas that protects the earth from the sun's harmful radiation.
12. A mixture of rotted plants and food that is used as a fertilizer.
14. Millions of stars in one area of space.
15. The line where the sky and earth appear to meet.
18. The study of light and vision.

"Gravitation cannot be held responsible for people falling in love. How on earth can you explain in terms of chemistry and physics so important a biological phenomenon as first love? Put your hand on a stove for a minute and it seems like an hour. Sit with that special girl for an hour and it seems like a minute. That's relativity"

-Albert Einstein-

"In any given moment, we have two options: to step forward into growth or to step back into safety"

-Abraham Maslow-

"All of science is nothing than the refinement of everyday thinking"

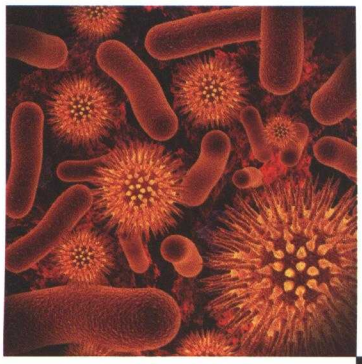
-Albert Einstein-

"Everything is energy and that's all to it. Match the frequency of the reality you want and you cannot help but get that reality. It can be no other way. This is not philosophy. This is physic"

-Albert Einstein-

"The secret of change is to focus all your energy, not on fighting the old, but on building the new"

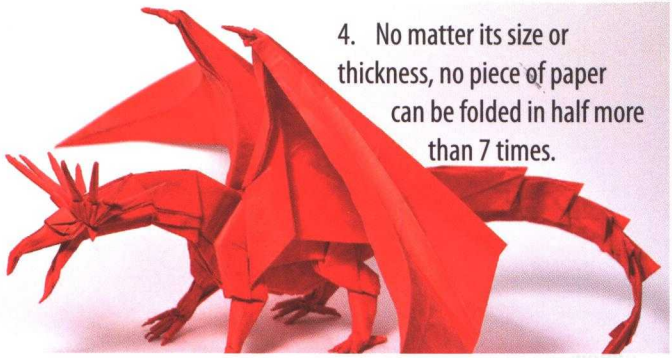
-Socrates-



1. The human body is full of friendly bacteria, with organisms on our skin and in our guts help to keep our bodies humming. Breast milk alone can have up to 700 species of bacteria, according to a study released in January 2013.

2. Seahorses don't have stomachs, just intestines for the absorption of nutrients from food. Food passes through their digestive system rapidly, so they eat plankton and small crustaceans almost constantly.

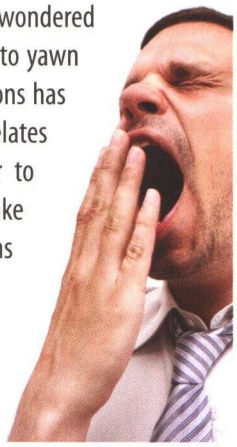
3. Hershey's Kisses are called that because the machine that makes them looks like it's kissing the conveyor belt.



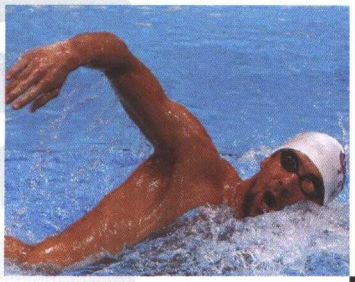
4. No matter its size or thickness, no piece of paper can be folded in half more than 7 times.

5. According to an old English system of time units, a moment is one and a half minutes.

6. Flying from London to New York by Concord, due to the time zones crossed, you can arrive 2 hours before you leave.

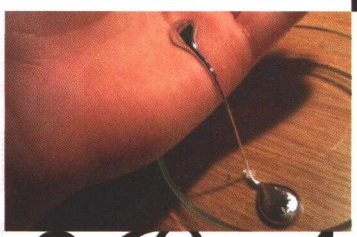


7. Yawning really is contagious. If you've ever wondered why watching someone else yawn action us to yawn in return, look no further! Recent investigations has revealed that our yawn mimicking possibly relates to subconscious 'herding behaviour', similar to the mechanism that cause flocks of birds to take flight simultaneously. And it's not just humans who suffer from contagious yawning – apes are at it too! Chimpanzees are thought to be the only other creatures, apart from humans, who do so.



8. It is easier to swim in a sea rather than in a river because the density of sea water is more compared to that of a river due to dissolved salts.

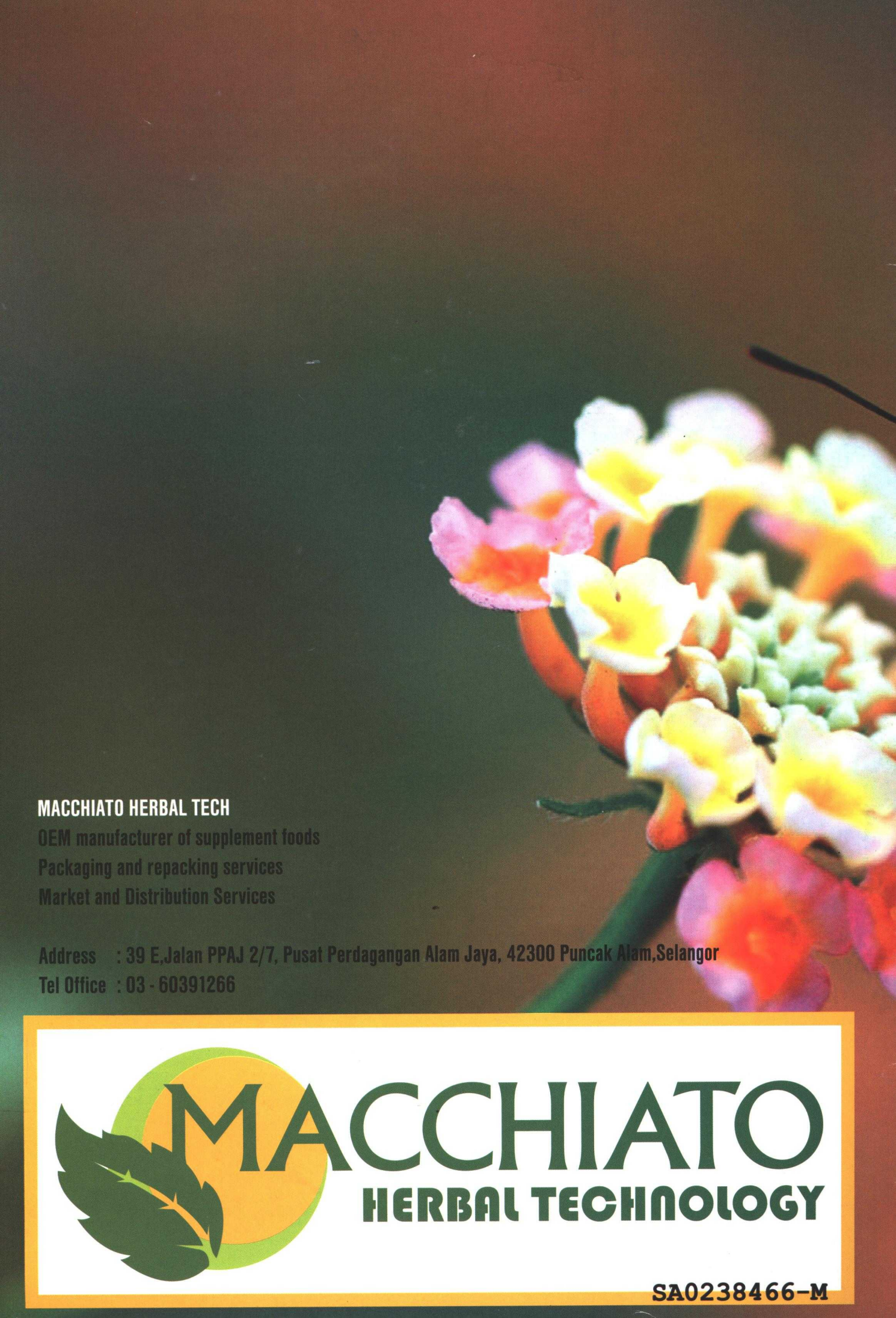
9. One of the most accidental discoveries was the one of microwave. This discovery happened after a researcher walked by a radar tube and a chocolate bar melted in his pocket.



10. Quick silver is not silver, but it is another name of mercury. It is so heavy that a piece of iron floats on its surface.

11. Take any three figure number in which the first figure is larger than the last, say 521. Reverse it, making 125 and subtract the smaller from the larger, making 396. Now add the result to the same number reversed, 693. The answer is 1089, and will be 1089 whatever number you start with.

12. Frogs don't need to drink water since they can absorb it through their skin. Humans, on the other hand, have waterproofing proteins in their skin to help prevent water loss.



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