

KERATAN AKHBAR-AKHBAR TEMPATAN
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Bil	Tajuk	Akhbar
1.	Put STEM under microscope	Malay Mail
2.	Minyak enjin dirumuskan ester TMP	Berita Harian

Put STEM under microscope

THE topic of Science, Technology, Engineering and Mathematics (also known by its acronym STEM) has been regularly covered in the press.

Most of the products that marvel us today; be it a phone that boasts the latest technology and camera capabilities, a car that can go from 0 to 60 in less than five seconds or medical equipment that provides a second opportunity for life; are the result of work done by professionals in these fields.

With specific reference to the engineering sector, engineering schools around the world are educating a new generation of engineers to tackle some of the most pressing issues facing society in the 21st century. The American National Academy of Engineering (NAE) has identified 14 Grand Challenges for Engineering which addresses four themes they consider "essential for humanity to flourish" — environmental sustainability, health, reducing our vulnerability and adding to the joy of living.

This is a clarion call to action, with the aim of being the focal point for society's attention to opportunities and challenges that are affecting our quality of life made possible by STEM education.

Our global community is able to thrive in today's way of life because of discoveries achieved through the STEM field and the future of life as we know it is also dependent on the efforts of individuals involved in this field.

Continued advancement in this field is dependent on interest by future generations. Universally, there has been a decline in trend for interest by today's youth in this area and as academics involved in the areas of Biosciences and Engineering; this is a cause for concern.

In September last year, Science, Technology and Innovation Minister Datuk Seri Madius Tangau said that only 28 per cent of the country's workforce comprised of highly skilled STEM workers in 2015. The minister also revealed that only 21 per cent of students in the country were eligible to take up STEM-related courses.

This declining interest in STEM does not bode well for the future of the country and we fully support the government's initiatives to reverse the current trend to increase the number of students in the sciences streams and those pursuing STEM



Winners of the Science, Technology and Innovation Ministry's National Innovation Awards at the awards presentation ceremony in October last year. Madius said that only 28 per cent of the country's workforce comprised highly skilled STEM workers in 2015. — Picture by Bernama

courses at universities. These efforts must begin from primary level and continue throughout secondary school.

Any country that wishes to be progressive must do so with the fortitude of a populace that not only appreciates the importance of STEM but also embraces the many improvements in the quality of life resulting from STEM discoveries and innovations, such as improving longevity, medical breakthroughs, environmental sustainability, space exploration, smart buildings, Internet of things, among others.

Not only that, we need a sustained effort to enhance the appreciation of STEM in society be they parents, employers in relevant industries or education counsellors to stress the importance of STEM and look beyond job markets which may not select for STEM expertise specifically.

In last year's August edition of the Unesco Asia-Pacific Education Thematic Brief, the focus was the gender gap in the field of STEM and the steps that can be taken to address this issue. It referenced a 2015 survey conducted by the Manpower

Group which highlighted a global "talent shortage" of 38 per cent, with the top 10 hardest jobs to fill including a number of STEM-related professions. The Unesco Institute for Statistics has estimated that, globally, 28 per cent of scientific researchers comprise of women.

As academics, we can only hope that in future, the make-up of graduates entering the individual sectors of the STEM field is balanced. Part of the solution towards achieving this is the availability of authentic and real discussions and dialogues on the gender gap, not in participation per se, but the percentage of women in the upper echelons of science. The gap itself needs to be factually established, and reasons that this gap exists needs to be discussed with maturity.

We would like to laud the efforts undertaken by bodies such as the Academy of Sciences Malaysia and the Organisation for Women in Science, Malaysia Chapter which share our aim to promote women in scientific and technological leadership roles. By receiving encouragement and mentorship to succeed in STEM careers,

the STEM professionals who participate in such efforts are able to better balance their professional and personal lives.

Recognising this, we have made it a priority to collaborate with organisations that provide holistic support to local graduates and hope that we can form stronger partnerships with more bodies.

It is also our hope that this component is thoroughly assessed and factored in the National STEM Action Plan that is currently being drafted by the Science, Technology and Innovation Ministry and the Higher Education Ministry.

We need to fan interest in these areas, particularly in our future women STEM professionals, and provide platforms for them to excel in their efforts.

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Minyak enjin dirumuskan ester TMP



Prof Robiah (dua dari kiri) menerangkan hasil inovasi kepada Timbalan Menteri Sains, Teknologi dan Inovasi, Datuk Dr Abu Bakar Mohamad Diah.

info

Ester TMP

→ Minyak enjin sesuai digunakan untuk jentera pertanian dan kenderaan biasa kerana bersifat terbiodegradasi serta dapat melindungi alam sekitar jika berlaku tumpahan tidak sengaja atau pelupusan haram.

→ Penyelidikan pernah memenangi beberapa anugerah, antaranya pingat emas pada British Invention Show 2004 dan pingat perak pada International Product Exhibition 2004 di Geneva, Switzerland.

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Penyelidik Universiti Putra Malaysia (UPM) berjaya menghasilkan Green Synthetic Engine Oil yang berkualiti mesra alam dengan menggunakan stok asas utama, iaitu Palm Oil Based Trimethylolpropane (TMP) Ester.

Ketua Penyelidik dari Jabatan Kejuruteraan Kimia dan Alam Sekitar, Fakulti Kejuruteraan UPM, Prof Dr Robiah Yunus, berkata TMP ialah ester sintetik yang boleh digunakan sebagai minyak asas bagi pelbagai jenis pelincir,

termasuk minyak enjin.

Katanya, pelincir khas perlu digunakan pada enjin kereta petrol untuk mengurangkan geseran dan pembentukan bendasing, melawan pengoksidaan serta mencegah hakisan.

Tidak toksik

Beliau berkata, satu formula khas dibangun menggunakan ester TMP dan bahan aditif terpilih untuk memenuhi keperluan pasaran.

"Penggunaan ester TMP sebagai minyak asas atau campuran dalam minyak enjin biosintetik dapat meningkatkan biodegradasi pelinciran minyak enjin. Minyak ini direka untuk membantu meningkatkan

prestasi, kuasa pembersihan dan perlindungan enjin serta mengurangkan pencemaran alam sekitar.

"Ujian makmal menunjukkan penggunaan minyak biosintesis adalah produk berkesan untuk melindungi enjin dan jentera. Ia juga mesra alam, tidak toksik dan tidak terkumpul dalam organisma marin.

Peringkat percubaan

"Selain itu, minyak motor dan pelincir yang dirumuskan dengan ester TMP boleh dikitar semula dan dilupuskan dengan lebih bebas berbanding minyak berasaskan petroleum," katanya.

Prof Robiah berkata, minyak sawit adalah

bahan mentah yang diguna untuk menghasilkan ester TMP dengan teknologi tekanan rendah bagi memastikan ester TMP yang terhasil adalah stabil pada suhu tinggi seperti dalam minyak enjin.

"Ester TMP yang berada dalam pasaran kini dihasilkan dengan tindak balas pengesteran menggunakan asid lemak sebagai bahan mentah. Ia berkualiti rendah kerana kandungan asid yang tinggi dan kekurangan kestabilan oksidatif.

"Kelebihan Green Synthetic Engine Oil dihasilkan melalui proses transesterifikasi (tindak balas kimia antara alkohol dengan ester) menggunakan ester metil sawit

sebagai bahan mentah.

"Penggunaan teknologi tekanan rendah ini memastikan kestabilan haba dan oksidatif pada produk," katanya.

Beliau berkata, penyelidikan produk itu mula dijalankan pada 2003 hingga 2013 dengan turut membabitkan beberapa penyelidik lain, termasuk Dr Ooi Tian Iye, Dr Siti Zubaidah Sulaiman, Dr Chang Teck Sin dan Dr Nurin Zulkifli.

"Teknologi untuk menggunakan ester TMP dalam minyak enjin dilesenkan kepada D20 Resources Sdn Bhd. Bagaimanapun, minyak enjin berdasarkan ester TMP masih pada peringkat percubaan," katanya.