

CELEBRATING  
COMMERCIALISATION  
YEAR 2014

# iiindex 2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

invention  
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& design  
exposition 2014

INNOVATEUR  
wannabe!  
2014

27<sup>th</sup> - 30<sup>th</sup>  
APRIL 2014  
DEWAN AGUNG TUANKU CANSELOR (DATC)  
UNIVERSITI TEKNOLOGI MARA  
MALAYSIA

*Bridging  
the valley of death :  
advancing the  
commercialisation  
of research*

RESEARCH BOOK

# iiindex2014

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innovation  
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## FOREWORD

The Honourable Minister of Science, Technology and Innovation (MOSTI) has launched 2014 as Malaysia Commercialisation Year 2014 (MCY2014) with the theme Science Technology and Innovation (STI) for Wealth Creation. In line with this theme, Invention, Innovation, Design & Exposition 2014 (iidex2014) is an annual exposition organized by UiTM and is the ultimate platform to highlight and commercialise new inventions and innovations. Researchers and inventors will exhibit their products which cater to the needs and wants of the community and the country.

The iidex2014 creates a new dimension by fusing two competitive concepts, a competition among innovative products and a competition to invite Innovateur Wannabes to perform live pitching of their products to the audience. The iidex2014 focuses on comprehensive commercialization and creating opportunities for entrepreneurs to carry out R&D as well as to provide avenue to commercialise their products. Through expositions such as iidex2014, MOSTI hopes to inculcate the culture of commercialisation of new technology designed and created by Malaysians.

I wish to congratulate all the participants of the iidex2014 and this is the opportunity for all researchers to show their ideas and exhibits their products and creativity. Apart from showcasing their products, innovators will have the opportunity to provide a window to the industry for business matching during the exposition.

Tan Sri Dato' Sri Sallehuddin Mohamed  
Pro-Chancellor, Universiti Teknologi MARA

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## FORMULATION OF ISOPROPYL LAURATE (IPL) DRILLING FLUID

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Drilling fluid is a circulation fluid used to perform various functions required in the drilling operations. Drilling fluids are materials that are pumped through the rig's drill string and drill bit to remove drill cuttings from the bore hole during drilling operations. They also clean the bit, maintain desired pressure differential between the formation and mud and serve to stabilize the hole. There are few types of drilling fluid such as oil based, water based, and synthetic based. Synthetic based drilling fluids are a relatively new class of drilling fluids that are particularly useful for deepwater and deviated hole drilling. They were developed to combine the technical advantages of oil based drilling fluids with the low persistence and toxicity of water based drilling fluids. Isopropyl laurate drilling fluid is one type of synthetic drilling fluid. Esters are formed by the reaction of a carboxylic acid with an alcohol under acidic conditions. Isopropyl laurate (IPL) is an ester derived from palm oil kernel and it can resist high temperature that made it suitable to be used as the base of drilling fluid. The development of the IPL drilling fluid can be a substitute to oil based drilling fluid and be used at high temperature reservoir. The application of IPL drilling fluid is basically suitable for the temperature reservoir up to 200 degree Celsius. It has disposal properties similar to water drilling fluid and similar rheological properties to the oil based drilling fluid. The development of IPL drilling fluid satisfies both technical drilling and environmental criteria. The unique ecotoxicological properties of esters have reduced the impact of drilling fluids on the marine environment. Ester based drilling fluids meet the highest US Environmental Protection Agency Standards. Concentrations of ester based drilling fluids in sediments may decrease with time after discharge by resuspension, bed transport and mixing or by biodegradation. Base fluids are designed to be biodegradable under conditions that occur in offshore marine sediments. Sediment dwelling bacteria and fungi are able to use synthetics as a source of nutrition, releasing simple non-toxic metabolic degradation products. The cost of ester fluids is higher than the cost of mineral oil or synthetic petroleum-based drilling fluids, reflecting the expense of producing esters from renewable resources such as palm kernel oil. The highest cost is offset by the superior properties of ester based drilling fluids, in particular by increased rate of penetration, fewer drilling problems, lower cost of cuttings disposal, and reduced liabilities in the event of spillage. In the long run, ester carrier fluids offer a more economical solution. In these cases, the ester based drilling fluids cutting were discharge to the ocean. If cuttings cannot be discharged, however, the added cost of transportation to shore for land-based disposal may make the use of ester based drilling fluid cost-prohibitive. Synthetic based drilling fluid was used for the first time to drill a well in the Norwegian sector of the North Sea in 1990. Ester-based drilling fluids have been and are being used mainly in the Gulf of Mexico, Southeast Asia (Malaysia, Brunei), Australia and West Africa.