

CELEBRATING
COMMERCIALISATION
YEAR 2014

iiindex 2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

invention
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exposition 2014

INNOVATEUR
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2014

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UNIVERSITI TEKNOLOGI MARA
MALAYSIA

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

RESEARCH BOOK

iiindex2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND 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
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BIODEGRADABLE POLYMER FROM TERRESTRIAL EDIBLE MUSHROOM FOR ENHANCED OIL RECOVERY (EOR)

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Enhanced Oil Recovery (EOR) is the methods used after all natural energies in the reservoir have depleted. Once the natural energy is depleted, the reservoir is no longer able to produce hydrocarbon without the assistance of external mechanism. EOR could increase the percentage of hydrocarbon produced up to 40-60% of the total hydrocarbon in place, compared to 20-40% using primary and secondary recovery. Polymer flooding is one of the methods in EOR to recover more oil in the reservoir. Crude oil in many reservoirs is often much more viscous than water. Hence, water can flow through the porous rock much easier than oil, which takes longer time for the water squeezing its way to pass the oil droplets, thus sweeping less oil along with it. Reducing the mobility ratio of water (displacing fluid) to the oil (displaced fluid) is one way in increasing the amount of recovered oil and for more stable displacement of the oil. This can be achieved by mixing the water with polymer to thicken the water (more viscous), which is able to recover more oil as a means of tertiary recovery. Furthermore, this could avoid viscous fingering effect and increase the sweep efficiency. However, many synthetic polymers are not biologically degradable, which are prohibited to be used in some countries. Thus, the main objectives of this research are to prepare biodegradable polymer from terrestrial edible mushroom and analyze its rheological properties for potential EOR application. The biopolymer has been extracted and tested at varying divalent concentration, temperature, polymer concentration and salinity. Before the test, filtration test was conducted to ensure proper biopolymer hydration. The results showed that polysaccharides biopolymer has been produced, which could act as thickening agent to increase the viscosity of displacing fluid. Thus, this could reduce the mobility ratio of displacing fluid to the displaced fluid for more stable displacement. However, the biopolymer has to be tested in harsh condition in order to check its stability under such reservoir environment. The test showed that the viscosity of the biopolymer increased steadily with increasing biopolymer concentration, and decreased with increasing temperature, salinity and divalent test. In the harsh environment such as high salinity and high temperature reservoir condition, the selection of polymer depends on its properties those are able to withstand at such condition. Even the viscosity of this biopolymer decreased in such environment, its concentration could be increased to serve as stable thickening agent for a good displacement of the oil besides being environmental friendly. This could maintain low mobility ratio of displacing fluid to the displaced fluid, thus avoiding fingering effect. In conclusion, a novel biodegradable polymer from terrestrial edible mushroom can be potential candidate for EOR application and commercialization. The advantages of biopolymer such as environmentally friendly and the source of this type of biopolymer from terrestrial mushroom, which is in abundant supply to be turned into profitable biopolymer could offer bright future in EOR projects. This potential can be supported by the recent 30-year deal between Petronas and Shell Malaysia to implement the world's largest EOR projects in Malaysia. Moreover, this is aligned with one of the National Key Economic Areas (NKEAs), Oil, Gas and Energy (OGE), which has been attractive business contributing to socio-economy of the country such as reducing dependence on foreign oil, supporting job creation, increasing tax revenue and economic growth. Hence, the outcome of this research is in line with the NKEA in order to sustain the oil and gas recovery.