

CELEBRATING  
COMMERCIALISATION  
YEAR 2014

# iiindex 2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

invention  
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exposition 2014

INNOVATEUR  
wannabe!  
2014

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UNIVERSITI TEKNOLOGI MARA  
MALAYSIA

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

RESEARCH BOOK

# iiindex 2014

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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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## ULTRASONIC WAVE AND PH ENHANCED THE FORMATION OF TiO<sub>2</sub> NANOTUBE STRUCTURE

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The rapid development in the field of nanostructure semiconducting oxides has stimulated intensive research efforts to understand comprehensively the properties of microstructure titanium dioxide (TiO<sub>2</sub>) are significantly different as compared to the properties of nanostructure TiO<sub>2</sub>. It is well known that the properties of TiO<sub>2</sub> are further enhanced when they are in nanosize. TiO<sub>2</sub> is considered as the most interesting metal oxides for the aforementioned application. The synthesis and characterization of TiO<sub>2</sub> nanostructure have received a great attention in recent years. TiO<sub>2</sub> is well known as a semiconductor with photocatalytic activities and has great potential in many areas, including environmental purification, gas sensors, photovoltaics, immobilization of biomolecules, and generation of hydrogen gas. Nanotubes are a great interest due to their high surface to volume ratio and size dependent properties. Several recent studies have indicated that TiO<sub>2</sub> nanotubes have improved properties compared to any other form of TiO<sub>2</sub> for application in photocatalysts, sensing, photoelectrolysis and photovoltaics. nanotube arrays of TiO<sub>2</sub> have been produced by a variety of methods including deposition into a nanoporous alumina template, seeded growth and hydrothermal processes. However, this nanotube fabrication routes' most remarkable properties are highly ordered nanotube arrays made by anodization of titanium in fluoride based baths the dimension of which can be precisely controlled. Uniform TiO<sub>2</sub> nanotube arrays of various pore size, length and wall thickness are easily formed by tailoring electrochemical conditions. Instead of using conventional electrochemical anodization process by magnetic stirring, an alternative method known as sonoelectrochemical process was used in this work due to its simple and cost effectiveness. The significance of using ultrasonic wave is that it has potential to enhance the mobility of ions in electrolyte. This process also can save time and energy. The structural and morphological properties will be discussed in details during poster presentation.