

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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STUDY THE EFFECT OF pMMA-SEEDED SUBSTRATE TO THE znO NANOSTRUCTURES

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Nanostructures can be obtained from various techniques such as vapour deposition or growth from solution, electrodeposition, pulsed laser deposition, sputtering, sol-gel synthesis, spray pyrolysis, and also with the vapour-liquid-solid method (at certain conditions). Zinc oxide (ZnO) has been recognized as metal oxide semiconductor with a wide direct band gap (3.37 eV) and large exciton binding energy (60 meV)]. Large exciton binding energy show the excitons in ZnO are thermally stable at room temperature which is important advantage in ultraviolet (UV) light-emitting devices, lasers and transparent conducting film. Recently, ZnO have been synthesized by a variety of methods such sol-gel spin coating, laser molecular beam epitaxy, hydrothermal, solid-state reaction, radio frequency sputtering and metal organic CVD. ZnO thin films is very attractive with promising application in solar cells, gas sensors, transducers, luminescent material, transparent conductors, heat mirrors, and semiconductor heterojunctions. The interest in polymer material has grown continuously in the last two decades. The usage of polymers is increasing day-by-day owing to their higher strength to weight ratio, lower cost, ease of moulding and lightness [1]. Several of methods for preparation of polymer thin films have been developed. Poly (methyl methacrylate) (PMMA) has been known as an optically clear amorphous thermoplastic and widely used as a substitute for inorganic glass. This is due to their characteristics which is higher impact strength and undergoes ductile rather than brittle fracture. Furthermore, PMMA is a common coating material and known as transparent, stiff materials and hard due to excellent ultraviolet stability, outstanding outdoor weathering properties and low water absorption. Introduction of inorganic particles into organic polymers currently are of great interest where organic-inorganic composites offer an effective way to improve the physical properties of conservative polymers. For example mechanical properties, thermal stability, flame retardancy, electrical properties, and chemical reagent resistant. These properties make it ideal for various applications such airplane windshields, skylights, lenses and outdoor signs. ZnO is well recognized for its excellent UV absorption as reported by Z. C. Orel. UV absorbers are organic or inorganic compounds which absorb all UV light ($\lambda > 400$ nm). By introducing nanosized ZnO into PMMA polymer mainly focuses on improving the mechanical properties of PMMA polymer which acting as multifunction materials in UV shielding, antibacterial or bactericides. Besides that, semiconductor nanocrystal such TiO₂, ZnO and ZnS can be introduced into PMMA matrix, which could be applied in transparent UV-protective coatings or UV-shielding windows. This is due to the characteristics of PMMA polymer which does not filter ultra-violet (UV) light. Polymer-inorganic has been considered to be novel and fast-growing class of materials, which have properties of both inorganic nanoparticles and polymers. Incorporation of inorganic nanoparticles can probably improve the performance of polymer matrix in terms of mechanic, thermal, optical and electrical properties. Therefore, the simplicity of the fabrication between this incorporation of the materials might be considered as a excellent candidates for UV-shielding applications. ZnO nanostructures on PMMA polymer seeded-substrate were successfully prepared by using solution-immersion and spin-coating method. In this study, PMMA polymer was deposited on glass substrate by using spin-coating technique. Spin-coating is a technique broadly used in polymers coating and depositing thin polymer layers on solid substrates. To obtain desired coating with less of thickness, dilute solutions of polymer is used. Layers of PMMA polymer on substrate was varied into 1, 3, 5 and 7. Then, all the substrates was subsequently immersed in ZnO solution for 4 hours. Finally, surface morphology of the samples was characterized by using Field Emission Scanning Electron Microscope (FESEM) and UV-Vis characterization. The samples were also characterized by using EDAX analysis.