UNIVERSITI TEKNOLOGI MARA

EFFECT OF MILLING PARAMETERS AND MAGNESIUM DOPING ON STRUCTURAL AND OPTICAL PROPERTIES OF NANO ZINC OXIDE SYNTHESIZED BY MECHANOCHEMICAL PROCESSING

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Sciences

Faculty of Applied Sciences

January 2013

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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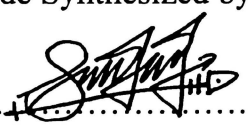
Signature of Student	:	
Date		January 2013

ABSTRACT

Nanoparticles of undoped and Magnesium doped Zinc Oxide were prepared using mechanochemical synthesis. Zinc Chloride, Sodium Carbonate and Sodium Chloride were milled together in ball mill with different period of milling time and molarity of Sodium Chloride as diluents agent added to analyze the effect of different milling parameters on structural and optical properties of Zinc Oxide obtained. After milling, the samples were subjected to different heat treatment process and analyzed using X-Ray Diffraction spectrometer to check the progress of reaction and find the crystallite sizes of nanopowders. UV-Vis spectroscopy was employed to get the value of energy gap for the samples while Field Emission Scanning Electron Microscope are used to observe the microstructure of samples. From the result, the best optimum time to synthesis nanoparticles Zinc Oxide with lowest particle size is 5 hours and the optimum amount of diluent (PCA) to use in this technique is 6 moles. Other than that, the increasing of heat treatment temperatures was found to increase the crystallite sizes of nanoparticles obtained. ZnO nanoparticles displayed significant recovery of defects that were introduced during milling process as evidenced by XRD analysis. Magnesium doping is seen to influence the crystallite size by arresting the crystal growth during milling and heat treatment. From the synthesized ZnO nanoparticles, it can be seen that crystallite size of the nanoparticles displayed an inversely proportional relationship with energy gap value after prepared with different milling conditions and ratio of Magnesium doping. The increasing of energy gap with the decreasing crystallite size is attributed to the quantum confinement effects.

ACKNOWLEDGEMENTS

First of all, thanks to God for giving me the opportunity and health so that I can complete my research and this thesis successfully.

Special thanks to my beloved supervisor, Dr Mahesh Kumar Talari for his guidance, support and always patience during conducting me for few years of my study. I would like to thank to my co-supervisor Encik Azlan Zakaria for his support.

Thanks to my father, Mr. Mohd Zor Ali who always support me during my study and also giving the financial support in order to help me complete my study. Thanks also to my mother, Madam Rohana Mohamed and my siblings for their patience, motivation and encouragements that always give me the excitement to further study.

Thanks to Dean, Prof Madya Dr Siti Halijjah Shariff and also to my Head Programme Department, Dr. Sharifah Aminah Syed Mohamad who always gives support and motivation in their speech and talk and also gives the permission and budget to attend some conferences.

Special thanks to my husband, Mr Mohd Shafie Saharuddin and also to my friends, Anis Syahirah Abu Bakar, Wan Aimi Zalikha, Nurul Syahidah Sabri and Akidah Yusak who always helped me during this research and give the moral support until I completed my study with successful.