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Investigation of Structural, Optical and Antibacterial Activity of Zinc Oxide Nanoparticles (ZnONPs)

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Abstract. Investigations of zinc oxide nanoparticles (ZnONPS) in various applications had been well-reported. In this study, the ZnONPs was synthesized using the simple method which is sol-gel method. Then, the structural and optical of ZnONPs under different pH value (pH7-11) were characterized. X-ray diffraction (XRD) measurements were performed to obtain the structural information of the samples. The XRD results showed that the ZnO has hexagonal wurtzite structure and dominated in plane (100), (002), and (101). To acquire the morphology and particle size of the samples, Field Emission Scanning Electron Microscopy (FESEM) was used plus the Energy Dispersive X-ray (EDX) to obtain the elemental composition of ZNONPs. Fourier Transform Infrared Spectroscopy (FTIR) was to determine the functional group of the samples. The Photoluminescence (PL) and Ultraviolet-Visible (UV-Vis) was employed to study the optical properties of the samples and the absorption peak of the samples under various pH value. While for the antibacterial activity, the ZnONPs under different pH value were tested against coliform bacteria. From the antibacterial activity, the higher pH value of ZnONPs shows the greater of inhibition zone. ZnONPs can be one of the alternative/potential of metal oxide nanoparticles for wastewater treatment since it has the antibacterial properties and partly neutral to water.

Keywords: ZnONPs, structural, optical, antibacterial activity