

Effect of citric acid addition upon the precipitation process on the nanostructural characteristics of zno nanoparticles

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Abstrak

Zinc oxide (ZnO) nanoparticles have been investigated in depth, due to their potential as a semiconductor material in dye sensitized solar cell applications. In this current research, ZnO nanostructure was synthesized using a simple precipitation technique with the addition of citric acid (C₆H₈O₇) as the capping agent. Various ratios of ZnO and citric acid were prepared, i.e. 1:1, 2:1, 4:1 and calcination temperatures of 150 and 400°C were used to investigate the effect of those parameters on the ZnO nanostructure and its crystallinity. The nanostructure characteristics, i.e. nanocrystallite size, crystallinity, and optical properties were determined by using x-ray diffraction (XRD), scanning electron microscopy (SEM), and ultra-violet visible (UV-Vis) spectroscopy, respectively. The investigation results showed that ZnO nanostructure was formed as spherical shapes and rods in the range of 19.8–30.8 nm with the lowest band gap energy (E_g) of 3.15 eV obtained under conditions of a 4:1 ratio and calcined at 400°C. Considering nanostructural characteristics, the ZnO nanostructures in this study would be suitable for application as a semiconductor oxide layer in a dye sensitized solar cell.