

Characterization of Tin Oxide (SnO₂) Nanostructures Prepared By Thermal Oxidation

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Abstract:

Tin oxide (SnO₂) nanocrystals and nanowires were successfully synthesized on Si(100) substrate by thermal oxidation method at different oxidation temperatures 450°C, 500°C and 550°C. The synthesized nanostructures were characterized by FESEM, Uv-Vis and Photoluminescence spectrum. The morphology of the samples was confirmed by FESEM and the optical properties were obtained from Uv-Vis and photoluminescence (PL) spectrum. Tin oxide nanocrystals were obtained at oxidation temperatures 450°C and 550°C. However, at 500°C, tin oxide nanowires were obtained. The energy band gaps of tin oxide nanocrystals at 450°C and 550°C were 1.35eV and 1.25eV respectively and energy band gap of tin oxide nanowires at 500°C was 1.21eV. PL emission spectra results showed that tin oxide nanocrystals at 450°C exhibit maximum emission at 775nm (1.60eV) at first maximum peak and 815nm (1.52eV) at second maximum peak while tin oxide nanowires at 500°C exhibit first maximum peak at 450nm (2.76eV), second maximum peak at 500nm excitation (2.48eV) and third maximum highest peak at 650nm excitation (1.91eV).