

Wachirapun Punkrawee 2008: Preparation and Characterization of Tin dioxide (SnO₂) Nanoparticles and Gas Sensor Application. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Associate Professor Sutatip Siripaisarnpipat, Ph.D. 87 pages.

Tin dioxide (SnO₂) nanoparticles were synthesized by 6 procedures. Only the procedure using propylene oxide causes gel formation. All products were calcined at 600 °C for 2 hours. All calcined products show similar powder X-ray Diffraction patterns as commercial SnO₂. The phase of the synthesized SnO₂ is cassiterite. The FT-IR spectra exhibit characteristic peaks for O-Sn-O vibrations at 613-620 cm⁻¹ and 450-540 cm⁻¹ while RAMAN spectra exhibit peaks at 600-650 cm⁻¹ and 400-500 cm⁻¹. The SnO₂ nanoparticles obtained by template method show irregular shapes including rods, triangular plates and square plates. Thermograms for all as-prepared products exhibit the weight loss from 100 °C up to 550-700 °C indicating that no SnO₂ products were lost. The surface area of the selected calcined products are in the range of 16 – 23 m²/g. The observed band gaps of SnO₂ products range from 2.12 to 3.65 eV. It reveals that some products contain SnO. In gas sensor application, the high band gap of SnO₂ is required. It was found that SnCl₂NH₄Cl and SnCl₂NH₄F are suitable for sensor application.

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Student's signature

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