

TiO₂ porous nanoparticles synthesized by co-condensation method using different temperatures.

The objective of this research is to investigate the synthesis of porous single-phase nano-titanium using titanium (IV) isopropoxide (TTIP) as a precursor and three types of surfactant as structure directing agent or template; CTAB, MTAB and Sugar Ester S770. Co-condensation method combined with bi-phasic condition is utilized for the synthesis. The formation of titanium nanoparticles occurs at about 65 °C under atmospheric pressure and the basic environment. To obtain a single-phase nano-titanium, the obtained as-synthesized TiO₂ are dried and calcined at 80 and 550 °C, respectively. Calcined particles are then analyzed and tested with various analytical techniques. Water retention is analyzed by dipping of TiO₂ particles in deionized water (DI-water). Surface area and porous volume were analyzed by BET technique while the size and distribution of porosity were analyzed by BJH method with nitrogen adsorption (N₂-isotherm). Morphology and internal nanostructure of particles were analyzed through the SEM and TEM techniques. UV-vis and XRD techniques were used to determine the energy band gap and composition of the obtained particles, respectively, while water contact measurement was employed to evaluate the hydrophilic properties of synthesized particles. Results from preliminary experiment showed the successful synthesis of TiO₂ nanoparticles with highly porous surfaces in which can be utilized in various applications like preparation of nanocomposite membranes, agriculture and solar cells.

Keywords: Synthesis, Monodisperse, Mesoporous, TiO₂, Nanoparticles.

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