

Structural and optical properties of Fe doped TiO₂ nanoparticles

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Abstract

In this work, Fe doped TiO₂ nanoparticles at different Fe/Ti molar ratio from 1 to 10% and different annealing temperature from 400 to 800 °C were investigated by X-ray diffraction spectroscopy, transmission electron microscopy (TEM) and diffuse reflectance spectroscopy (DRS). The size of prepared nanoparticles was estimated between 6 to 100 nm by transmission electron microscopy. The characterization by diffuse reflectance spectroscopy revealed that the optical absorption in the visible region significantly increased by doping of TiO₂ nanoparticles. The calculated gap energy by second derivative of Tauc plot demonstrated that the gap energy decreased to 2.5 eV for samples at higher Fe content and annealing temperature.

Keywords: TiO₂ nanoparticles, Fe doped TiO₂, Optical properties, Diffuse reflectance spectroscopy