

## **Effect of Fe doping on phase transition of TiO<sub>2</sub> nanoparticles synthesized by MOCVD**

### **ABSTRACT**

Titanium dioxide (TiO<sub>2</sub>) nanoparticles were prepared via Metal Organic Chemical Vapour Deposition (MOCVD) technique at 400 and 700°C. Different amount of iron (Fe) dopant was introduced inside the MOCVD reactor along with the precursor to produce different Fe dopant concentrations of TiO<sub>2</sub> nanoparticles. Transmission Electron Microscope (TEM) results disclosed that increasing the deposition temperature resulted in a significant decrease of the size of TiO<sub>2</sub> nanoparticle samples and a narrower size distribution. X-ray diffraction (XRD) results revealed that TiO<sub>2</sub> nanoparticle sample deposited at 400°C was amorphous while the sample deposited at 700°C was in anatase crystal structure. Fe doping induced phase transition from amorphous to anatase for sample deposited at 400°C and from anatase to rutile for sample deposited at 700°C. Increased concentration of Fe dopant promoted both phase transitions. Meanwhile, TEM and XRD data disclosed that increased concentration of Fe dopant lead to a decrease in size of the nanoparticles produced.

**Keyword:** Titanium dioxide; Fe doped; Nanoparticles; MOCVD; Phase transition