

Structured TiO₂ nanoparticle preparation for solar cells

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In our group, TiO₂ nanoparticles have been prepared by using an amphiphilic organic block copolymer as a templating agent via a sol-gel process [1]. Different morphologies of TiO₂ nanoparticles are obtained, and investigated by using Photoluminescence (PL), Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM) and X-ray Diffraction (XRD) and Grazing Incidence Small Angle X-ray Scattering (GISAXS) [2,3]. In another approach the ability of poly(dimethylsiloxane) (PDMS) to turn into silicon-oxi carbide (Si-O-C) after being heated to elevated temperatures is combined with TiO₂ nanoparticle preparation [4]. It is believed to act as an alternative to the conventional blocking layer between conducting transparent electrode and the photoactive layer in hybrid organic solar cells. Kelvin Probe Force Microscopy is used for measuring the work function of the nanocomposite film. Furthermore, TiO₂ nanoparticles are being modified with different conducting polymers by various synthetic strategies to enhance the percolation throughout the layers in photovoltaic devices. After their characterization, their effect in hybrid organic solar cell performance is tested.

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