



Synthesis of Fe-TiO₂ Nanoparticles for Photoelectrochemical Generation of Hydrogen

Álvaro Realpe*, Diana P. Núñez, Adriana Herrera

Department of Chemical Engineering, Research Group of Modeling of Particles and Processes, University of Cartagena, Cartagena, Colombia

Abstract : In this paper, nanostructured photoanodes were made from titanium dioxide (TiO₂) nanoparticles doped with Fe in order to modify its absorption range in the electromagnetic spectrum. The TiO₂ nanoparticles were obtained by a green biological route, using an extract derived from leaves of lemon grass as a reducing agent; these nanoparticles were doped by wet impregnation mechanism and supported like thin films prepared by Dr. Blading method. The morphology, structure and optical properties were evaluated by scanning electron microscope (SEM), X-ray diffraction (XRD), UV-VIS diffuse reflectance spectroscopy (UV-VIS/DRS) and photocurrent measurements. The characterization shows nanoparticles with the photoactive anatase phase of TiO₂ with an approximate size of 56 nm. Doping of Fe⁺³ in TiO₂ resulted in a shift of absorption edge towards the visible region of solar spectrum, it was observed a decrease in the band gap energy from 3.08 to 2.66 eV with increasing the doping concentration from 0 % w/w Fe up to 1.0 % Fe. The 0.5 % w/w Fe doped TiO₂ photoelectrode exhibited the highest photocurrent, 225 μA at zero external bias.

Keywords: Titanium Dioxide, Photoelectrode, Doped Nanoparticle, Band Gap, Photoelectrochemical Water Splitting.

Álvaro Realpe *et al* / International Journal of ChemTech Research, 2016,9(8), pp 453-464.
