E Cerro-Prada et al., J Material Sci Eng 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.037

Synthesis and microstructural characterization of highly active nanocrystalline titania for enhanced photoactivity

E Cerro-Prada, S García-Salgado and **M A Quijano**
Technical University of Madrid, Spain

Incorporation of nanostructured chemically inert semiconductors with photocatalytic properties into cementitious materials is an important development in the field of heterogeneous photocatalytic pollution mitigation. Here we report a new composite material consisting of TiO_2 nanocrystals grown via sol-gel method at ambient temperature and undergone calcination in order to increase their crystallinity. On gelation of the ambient temperature prepared sols, dispersed nanoparticles of amorphous TiO_2 were obtained by titanium isopropoxide (TTIP) route. The amorphous materials obtained transformed to fully crystalline titania at 400°C. The effect of calcination temperature was evaluated. The high temperature thermal stabilities of this novel material were also studied. The prepared TiO_2 photocatalysts were characterized by X-ray diffraction, X-ray fluorescence, scanning electron microscopy, thermogravimetric analysis and Fourier transform infrared spectroscopy. The contents of anatase and rutile phases in the TiO_2 sols have been successfully controlled by simple thermal annealing. The active photocatalytic sites related to the surface area of TiO_2 are the key factor in determining the photocatalytic activity. The as-prepared nanoparticles are expected to show an enhanced photocatalytic activity under UV- light irradiation, which can be attributed to the porous structure, large BET surface area, bicrystalline, and small crystallite size.

Biography

E Cerro-Prada received her PhD in Physics from Autónoma University of Madrid (UAM). She lectured at the University of Birmingham, UK, and worked at CERN, among other research and academic positions. She currently serves as a Lecturer and Head of the Physics Department at the Technical University of Madrid. She has contributed greatly to the understanding of cementitious materials microstructure by applications of nanotechnology and nanomaterials. She is currently involved in the development of titanium dioxide nanoparticles to provide cement-based materials with photocatalytic properties, as well as agent-based modelling for cementitious material microstructure.

elena.cerro@upm.es

Notes: