Synthesis, characterization, photocatalytic and photovoltaic performance of Ag-doped TiO2 loaded on the Pt-carbon spheres

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Abstract

Ag-doped TiO2 loaded on the Pt-carbon spheres have been synthesized and characterized by standard analytical techniques, i.e. UV-vis spectroscopy, X-ray diffraction (XRD) and scanning electron microscopy (SEM). In order to find the effect of loading of Ag doping on TiO2, the concentration of Ag varied from 0 to 3.5%. The XRD analysis showed that the obtained particles are anatase phase. The SEM images showed Ag-doped TiO2 are loaded on the surface of the Pt-carbon spheres. The photocatalytic activity of the synthesized particles was tested by studying the degradation of methyl orange and 2-chlorophenol as a function of time on visible light irradiation in aqueous suspension. Ag-doped TiO2@Pt-carbon sphere particle with platinum concentration of 3.0% showed the highest photocatalytic activity as compared to the other Ag concentrations for the degradation of methyl orange and 2-chlorophenol. The electrical properties shows that the dielectric constant epsilon, and loss tangent (tan delta) decreases with the increase in frequency ups certain limit, which on further increase in frequency become independent. The dielectric property also decreases by increasing the dopant concentration, giving valuable information about conduction process. The a.c, conductivity increases with the increase in frequency. Under simulated solar illumination with an optimum content of Ag, the amount of dye absorption increases with the increase in Ag content resulting in the gradual increase in photovoltaic current and improvement in the cell efficiency from 623 to 7.41%. (C) 2014 Elsevier Ltd. All rights reserved.

Keywords

Author Keywords: Ag-TiO2; Pt-carbon spheres; Degradation; Methyl orange; 2-Chlorophenol

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