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European Chemistry Conference 2018
July 4-6, 2018 Rome, Italy

Solar-Driven Wastewater Treatment Using Silver-Titanium Dioxide

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Solar-driven photo catalysis using doped semiconductors and particularly TiO_2 has been the subject of increasing works over the past decades. This is mainly due to economical reason using free solar energy. Several researches have recently been made to prepare solar–driven photocatalyts by doping TiO_2, either with metal or nonmetal with the aim of lowering the excitation energy. A great deal of effort has shown that doping with noble metals improves the capability of TiO_2 for visible-light absorption. Many researchers have studied the photocatalytic degradation of various organic contaminants using silver doped TiO_2 because its high stability, excellent electrical and thermal conductivity and lower cost. It has been shown that the particles of silver deposited on the surface of the titanium dioxide constituted of sites where the electrons accumulate. The modification with silver can be done by methods doping has been done by, photodeposition or microwave and laser-assisted methods, liquid impregnation. Anatase has higher photocatalytic activity and has been studied more than the other two forms of TiO_2. Some studies reported that decorating TiO_2 with silver nanoparticles (Ag) can enhance the photocatalytic activity of TiO_2 significantly due to increasing the lifetime of e-/h+ pairs and reducing energy band gap from UV to visible-light region.

To the best of our knowledge, among the various types of commercial TiO_2 used for doping studies the Millenium TiO_2-PC500 has attracted little attention despite its high surface area (›250 m^2/g) and 100% anatase structure. In this study, the photocatalytic degradation and adsorption of two dyes namely Red Congo and Cristal Violet was studied in the aqueous suspensions of TiO_2 PC500 and Ag-deposited TiO_2 PC500 nanoparticles under visible and UV light irradiations. The prepared photocatalyst (Ag-TiO_2 PC500) was characterized by DRX, SEM and EDXRF. Prior to the study of the degradation of these two model molecules their adsorption onto Ag-TiO_2-PC500. The results show that their adsorption is consistent with L-H mechanism. The photocatalytic degradation of these two dyes using TiO_2-PC500 and Ag-TiO_2-PC500 was studied under UV and solar light by varying several experimental parameters such as pH, concentrations of substrate and photocatalyst. The results obtained show a significant increase in the Ag-TiO_2-PC500.

Biography:

Ghorab Mohammed Fouzi was PhD holder from Glasgow University (1988) in the field of Inorganic and surface chemistry. He was Professor of Chemistry at the University of Annaba since 2002. He was Author of several papers dealing with the preparation characterization and use of TiO_2 in the environmental chemistry. He Hold several scientific and academic positions at Annaba University and Qatar University where he held the position of Associate Professor in Chemistry.