Effect in photocatalytic methyl orange dye SnO_2 aerogel / rGO nanocomposites

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ABSTRACT

Recently, air pollutants and organic dyes in water are global concerns and the demand for solutions against several environmental issues has recently increased; Many researchers have been trying to develop photocatalytic degradation for the issues mentioned above. Semiconducting metal oxides such as TiO_2, ZnO, and SnO_2 are well known and widely used as photocatalysts due to their ability to generate electron–hole pairs by photon energy. In present work, the effect of reduced graphene oxide (rGO) addition to tin oxide aerogel were studied. The composites were synthesized using epoxide-initiated sol–gel method. A homogeneous dispersion of graphene oxide (GO) flakes in a tin precursor solution was achieved by ultrasonication. rGO flakes were captured in three-dimensionally networked SnO_2 aerogel matrix and the reduction of GO could be performed in the autoclave which was followed by supercritical alcohol drying.

The interaction between aerogel matrix and GO functional groups was confirmed as covalently bonded by a change in the optical bandgap of diffuse reflectance spectra and a peak shift in the Fourier transform infrared spectra. In addition, addition of rGO flakes in SnO_2 aerogel enhanced the photocatalytic activity in the methyl orange degradation. The amount of rGO loading in the SnO_2 aerogel matrix showed different photocatalytic activity; an appropriate amount of rGO was required for the highest enhancement in the photocatalytic activity of SnO_2 aerogel.

Keywords: Tin oxide aerogel; reduced graphene oxide; photocatalyst; methyl orange.

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