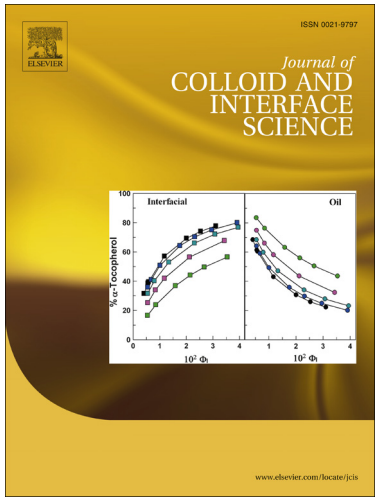

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A novel and green process for the production of SnO_2 quantum dots and its application as a photocatalyst for the degradation of dyes from aqueous phase

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ABSTRACT

Green synthesis of SnO_2 quantum dots (QDs) was developed by microwave heating method using the amino acids, namely, aspartic and glutamic acid. This method resulted in the formation of spherical SnO_2 quantum dots with an average diameter less than the exciton Bohr radius of SnO_2. The average diameter of SnO_2 quantum dots formed using glutamic acid is ~1.6 nm and smaller than that formed using aspartic acid (~2.6 nm). In the electronic spectra, a clear blue shift in the band gap energy from 4.33-4.4 eV is observed with a decrease in particle size (2.6-1.6 nm) due to three dimensional quantum confinement effects. The synthesized SnO_2 QDs were characterized by transmission electron microscopy (TEM), selected area electron diffraction (SAED) and Fourier transformed infrared spectroscopy (FT-IR). The optical properties were investigated using UV-visible spectroscopy. The synthesized SnO_2 QDs act as an efficient photocatalyst in the degradation of Rose Bengal and Eosin Y dye under direct sunlight. For the first time, Rose Bengal dye was degraded using SnO_2 QDs as a photocatalyst by solar irradiation.

Keywords: SnO2 QDs, aspartic acid, glutamic acid, photodegradation.

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