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Original research article

Green synthesis of tin dioxide nanoparticles using *Camellia sinensis* and its application in photocatalytic degradation of textile dyes

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Highlights

- Biosynthesis of SnO_2 nanoparticles was achieved using extracts of *Camellia sinensis*.
- The average size of nanoparticles obtained was 4.7 nm.
- SnO_2 nanoparticles degraded various organic pollutants in 180 min.

Abstract

SnO_2 nanoparticles (NPs) were synthesized by a green route using different concentrations (1, 2 and 4%) of *Camellia sinensis*. The biosynthesized nanoparticles were characterized using attenuated total reflection infrared spectroscopy (ATR-IR), scanning electron mic

transmission electron microscopy (TEM), and X-ray diffraction (XRD). In addition, its photocatalytic efficiency was verified via the sunlight and UV irradiation assisted degradation of commercial dyes Methylene Blue (MB), Methyl Orange (MO), and Rhodamine B (Rd-B). The SnO_2 NPs reached average sizes of 6.91, 5.2, and 4.7 nm, with a quasi-spherical shape. The NPs presented a hexagonal structure in the rutile phase, and an interplanar distance of 0.33 nm. Band gaps were calculated at 4.02, 3.95, and 3.79 eV using the TAUC model. The photocatalytic activity evaluation resulted in high percentages of degradation: 100 % of MB, 81 % of MO, and 100 % of Rd-B, under UV radiation.

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Keywords

Green synthesis; Tin dioxide; Organic dyes; *Camellia sinensis*; Photocatalytic degradation

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