

Ultrasonic synthesis of Fe-doped, N-doped and undoped titanium dioxide particles

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We used focused probe sonication to synthesize Titanium dioxide particles using varying concentrations of F^{3+} and Fe^{2+} for the Fe-doped TiO_2 and varying concentrations of melamine, a nitrogen rich source, for N-doped TiO_2 . All samples were analyzed using Raman spectroscopy. Rutile phase of TiO_2 was obtained for all Fe-doped particles and the anatase form was obtained for all N-doped TiO_2 . The ultrasonically synthesized particles were centrifuged and then incinerated in a muffle furnace at $650^\circ C$ before analysis. Extended periods of direct and continuous bath and probe ultrasonication without incineration of undoped TiO_2 produced the rutile phase only and no anatase form was observed. The rutile phase was produced after 40 minutes with

probe sonication and after 90 minutes with bath sonication. The photocatalytic utility of the synthesized particles was initially tested using the degradation of Rhodamine B when mixed with either doped TiO_2 or undoped TiO_2 and then irradiated with natural sunlight without stirring. A UV-visible absorption-scattering method was used to approximate the electronic band gaps of the synthesized particles and the assessment of the deviation from the expected 3.2 eV.

Speaker Biography

Innocent Pumure is currently working as an Associate Professor in the chemistry department of University of Missouri, USA. His expertise is in the field of water quality, extraction, mining, leaching, chemometrics, and vibrational spectroscopy.

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