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## Synthesis, characterization and enhanced photocatalytic degradation efficiency of Se doped ZnO nanoparticles using trypan blue as a model dye

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Se doped ZnO nanoparticles (NPs) were successfully synthesized by thermo-mechanical method whose band gap increased with concentration of Se doping. Transmission electron microscopy of 5 wt% Se doped ZnO NPs revealed spherical nanoparticles of average size of 9.5 nm. X-ray photoelectron spectroscopy (XPS) revealed Se 3d binding energy at 59.5 eV, confirmed SeO<sub>2</sub> in the doped ZnO NPs. Fluorescence emission spectroscopy of Se doped ZnO NPs revealed oxygen vacancies which increased with the concentration of Se doping. The photodegradation efficiency of trypan blue (TB) using 30 W UV lamp was higher for Se

doped ZnO NPs than pristine ZnO NPs, depended on Se doping concentrations, UV illumination, concentrations of photocatalyst and pH of the dye solution. The batch of 0.6 mg of 5 wt% Se doped in ZnO NPs per mL of TB dye maintained at pH 5 exhibited maximum photodegradation efficiency (89.2±3.1%). Higher photocatalytic degradation efficiency for Se doped ZnO NPs was correlated with incorporation of oxygen vacancies due to Se doping, which were likely intermediate levels for transiting photoexcited charge carriers for generation of hydroxyl radicals and consequently facilitated photodegradation. Terephthalic acid assay confirmed formation of hydroxyl radicals in dye solution treated with photocatalyst.

### Biography

Bhavani Prasad Naik is currently a post-doctoral research fellow at the Zhejiang University, China under the supervision of Prof. Hongzhanglian. He received his PhD degree in 2013, from Indian Institute of Technology, Roorkee, India under the guidance of Dr. Raj Kumar Dutta, where he carried out studies on antibacterial and photocatalytic applications of ZnO nanoparticles. He is currently working on the photocatalytic properties and applications of graphene-metal oxide nanocomposites. His scientific interests focus on synthesis and tuning of graphene-metal oxides nanocomposites and to study the effect of their optoelectronic and morphological properties in photocatalysis, water splitting and super capacitors etc.

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