

## Facile Synthesis of Sulfur Doped TiO<sub>2</sub> Nanoparticles with Enhanced Photocatalytic Activity

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**Abstract :** An effectual technology for wastewater treatment is a great demand now in order to encounter the water pollution caused by organic pollutants. Photocatalytic oxidation technology is widely used in removal of such unsafe contaminants. Among the semi-conducting metal oxides, robust and thermally stable TiO<sub>2</sub> has emerged as a fascinating material for photocatalysis. Enhanced catalytic activity was observed for nanostructured TiO<sub>2</sub> due to its higher surface, chemical stability and higher oxidation ability. However, higher charge carrier recombination and wide band gap of TiO<sub>2</sub> limits its use as a photocatalyst in the UV region. It is desirable to develop a photocatalyst that can efficiently absorb the visible light, which occupies the main part of the solar spectrum. Hence, in order to extend its photocatalytic efficiency under visible light, TiO<sub>2</sub> nanoparticles are often doped with metallic or non-metallic elements. Non-metallic doping of TiO<sub>2</sub> has attracted much attention due to the low thermal stability and enhanced recombination of charge carriers endowed by metallic doping of TiO<sub>2</sub>. Amongst, sulfur doped TiO<sub>2</sub> is most widely used photocatalyst in environmental purification. However, the most of S-TiO<sub>2</sub> synthesis technique uses toxic chemicals and complex procedures. Hence, a facile, scalable and environmentally benign preparation process for S-TiO<sub>2</sub> is highly desirable. In present work, we have demonstrated new and facile solid-state reaction method for S-TiO<sub>2</sub> synthesis that uses abundant elemental sulfur as S source and moderate temperatures. The resulting nano-sized S-TiO<sub>2</sub> has been successfully employed as visible light photocatalyst in methylene blue dye removal from aqueous media.

**Keywords :** ecofriendly, nanomaterials, methylene blue, photocatalysts

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