

## Ta-doped Nb<sub>2</sub>O<sub>5</sub>: Synthesis and Photocatalytic Activity

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**Abstract :** Ta-doped Nb<sub>2</sub>O<sub>5</sub> (Ta content 0.5-2% mole fraction) nanoparticles in the range of 20-40 nm were synthesized by combustion technique. The crystalline phase, morphology and size of the nanoparticles were characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM) and UV-vis spectroscopy. The specific surface area of the nanoparticles was measured by nitrogen adsorption (BET analysis). The undoped Nb<sub>2</sub>O<sub>5</sub> nanoparticles were found to have the particles size in the range of 50–80 nm. The photocatalytic performance of the samples was characterized by degrading 20 mg/L toluene under UV–Vis irradiation. The results show that the Ta-doped Nb<sub>2</sub>O<sub>5</sub> nanoparticles exhibit a significant increase in photocatalytic performance over the undoped Nb<sub>2</sub>O<sub>5</sub> nanoparticles, and the Nb<sub>2</sub>O<sub>5</sub> nanoparticles doped with 1.5% Ta and calcined at 450°C show the best photocatalytic performance.

**Keywords :** Nb<sub>2</sub>O<sub>5</sub>, Ta-doped Nb<sub>2</sub>O<sub>5</sub>, photodegradation of Toluene, combustion method

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