

Ta-doped Nb₂O₅: Synthesis and Photocatalytic Activity

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Abstract : Ta-doped Nb₂O₅ (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 Nb₂O₅ 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 Nb₂O₅ nanoparticles exhibit a significant increase in photocatalytic performance over the undoped Nb₂O₅ nanoparticles, and the Nb₂O₅ nanoparticles doped with 1.5% Ta and calcined at 450°C show the best photocatalytic performance.

Keywords : Nb₂O₅, Ta-doped Nb₂O₅, photodegradation of Toluene, combustion method

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