

Facile Synthesis of Ta₃N₅ Nanoparticles and Their Application as a Photocatalyst for MB Degradation

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Nanocrystalline tantalum nitride (Ta₃N₅) nanoparticles were prepared easily by a soft urea pathway which uses TaCl₅ as a metal precursor and urea as a nitrogen source, and their physicochemical properties were analyzed by XRD, UV-vis spectroscopy, SEM, and BET. In comparison with conventional nitridation method (850°C, 15h, NH₃), our method is energetically favorable (700°C), time-saving (3h), and non-toxic (N₂). Furthermore, our Ta₃N₅ showed smaller particle size (26 vs. 58nm) and higher surface area (26 vs. 6m²/g) compared to Ta₃N₅ synthesized by conventional method. In photocatalytic activity test under visible light irradiation ($\lambda < 400\text{nm}$), our Ta₃N₅ showed enhanced performance for methylene blue degradation than conventional Ta₃N₅.