Electrodeposition of CdS-TiO₂ for the Photocatalytic Degradation of Ammonia-Nitrogen Wastewater

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In this work, a simple, one-stage electrodeposition strategy was used to prepare a CdS-nanoparticle-sensitized TiO₂ (CdS-TiO₂) nanotube array. TiO₂ nanotubes sensitized by other narrow-band-gap semiconductors were also prepared using this distinct strategy. The CdS-TiO₂ hybrid exhibited more desirable physical and chemical characteristics for photocatalytic activity with stronger visible-light-response capacity compared with the original TiO₂ material. In comparison with the original TiO₂, CdSe/TiO₂, and CdTe/TiO₂, the catalytic capacity of CdS-TiO₂ to ammonia-nitrogen wastewater was higher. The maximum pH value for the CdS-TiO₂-induced ammonia-nitrogen removal was 10. Nevertheless, inhibition effects on ammonia-nitrogen degradation were exhibited by all common inorganic ions: Mg²⁺, Ca²⁺, K⁺, Na⁺, HCO₃⁻/CO₃²⁻, SO₄²⁻, NO₃⁻, and Cl⁻.

Keywords: Ammonia-nitrogen wastewater; Photocatalysis; Electrodeposition; CdS; TiO₂

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