The Enhanced Photoelectrocatalytic Activity of Ti/Co₃O₄ Nanowires by the Photodeposition of Ag for the Decolorization of Dyeing Wastewater

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Co₃O₄ nanowires (NWs) are a promising photoelectrocatalytic (PEC) material; however, they still need to be improved to increase the transport rate and separation efficiency of induced hole/electron pairs, thereby enhancing PEC performance. In this work, we demonstrate that the photodeposition of Ag into Ti/Co₃O₄ NW coatings can promote its PEC ability toward degrading high concentrations of dyeing wastewater. The PEC evaluation shows that the decolorization rate of anthraquinone dye (reactive brilliant blue KN-R) over Ag-modified Ti/Co₃O₄ NWs is 91.7%, which is higher than that of Ti/Co₃O₄ NWs (68.3%). This improvement in PEC activity can be ascribed to Ag-modified Ti/Co₃O₄ NWs having fast carrier transport, a low resistance, a high oxygen evolution overpotential, a large active area and good electron migration efficiency. Moreover, photoelectric synergy can be observed for Ag-modified Ti/Co₃O₄ NWs in the PEC process. The present study provides an effective strategy for the photoelectrochemical treatment of dyeing wastewater by using Ag-modified Ti/Co₃O₄ NWs as an anode.

Keywords: Photoelectrocatalysis, Co₃O₄, dyeing wastewater, Ag modification

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