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Visible light-driven photoelectrocatalysis coupling with electroenzymatic process for degradation of chloramphenicol

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Abstract

Photoelectrocatalysis (PEC) and electroenzymatic (EEC) process are two important techniques for degradation of refractory organic compounds. In this work, we coupled PEC and EEC (PEC-EEC) to develop a novel system for efficient removal of chloramphenicol (CAP) driven by visible light. This coupling system was constructed by a CdS/WO_3/FTO photoanode and a hemin-graphene immobilized cathode. The photoanode was fabricated by layer-by-layer assembly of CdS quantum dots on WO_3/FTO to provide high visible light activity. In order to achieve the EEC process, graphite cathode was modified with hemin-graphene composite, in which hemin served as the mimic enzyme. When CdS/WO_3/FTO anode was irradiated under visible light, photogenerated holes participated in the formation of hydroxyl radicals while photogenerated electrons were driven by bias potential to the cathode for the reduction of oxygen into hydrogen peroxide. Thus, organic pollutant could be