

Enhanced photocatalytic behaviors of CdS-TiO₂-WO₃ Ternary hybrid composite

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The composite of semiconductors with different band gaps and positions have an *in-built* potential energy gradient, which facilitates the charge pair separation with enhancing the photocatalytic and photo-electrochemical activities. Until now, many binary hybrid composites have been widely studied for environmental remediation and energy conversion applications but only limited studies have been published about ternary hybrid composites. In this study, we developed a ternary hybrid composite of CdS-TiO₂-WO₃ which was synthesized by two steps. The TiO₂-WO₃ hybrid was firstly synthesized by the modified xerogel method and then CdS was precipitated on the optimized TiO₂-WO₃ hybrid by hydrolysis. The binary hybrids (CdS-TiO₂ and CdS-WO₃) were also synthesized by the same precipitation method for the comparison with the ternary hybrid. All hybrids were characterized by XRD, TEM, EDS and UVDRS and the photocatalytic activities were tested by monitoring the reduction of polyoxometallate. The photoelectrochemical properties of the ternary hybrid electrode were also characterized by LSV, IPCE and EIS. The CdS-TiO₂-WO₃ ternary hybrid exhibited enhanced photocatalytic and photoelectrochemical activities.