Short communication

Sensitive Photoelectrochemical Detection of Cu^{2+} Using CdS Quantum Dots Decorated TiO_2 Nanowires in Combination with a Chemical Reducing Reaction

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TiO_2 NWs/CdS hierarchical nanocomposites were prepared for selective photoelectrochemical (PEC) detection of Cu^{2+} . TiO_2 nanowires were first prepared by a simple hydrothermal method. Then, CdS nanocrystals were successfully grown on TiO_2 NWs through the chemical bath deposition method. The prepared TiO_2 NWs/CdS nanocomposites were used as the photoanode for PEC sensing of Cu^{2+} . The introducing of CdS QDs significantly improved the visible light harvesting efficiency of the photoanode. Moreover, ascorbic acid was used as reducing agent for the rapid conversion of Cu^{2+} to Cu^+ , resulting in the formation of Cu_2S coated on CdS. The formed Cu_2S can act a recombination center which suppresses the charge transfer from the conduction band of CdS to TiO_2 and results in an attenuated photocurrent. Thus, a PEC sensor could be used for Cu^{2+} detection based on the target-induced formation of exciton trapping with the aid of a effective reducing agent. The results showed that the proposed sensor possesses a good selectivity and sensitivity for Cu^{2+} detection.

Keywords: Photoelectrochemical, TiO_2 nanowire, CdS quantum dots, chemical reducing

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