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Facile Formation of Ag_2WO_4/AgX (X = Cl, Br, I) Hybrid Nanorods via a Room-temperature Anion Exchange Reaction and their Enhanced Photocurrent and Photocatalytic Activities

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Extended Abstract

Semiconductor hetero-nanostructures exhibit enhanced or new physicochemical properties over their single-component counterparts for various applications. However, it is still a great challenge to develop simple and reliable strategies to synthesize tailored one-dimensional (1D) hetero-nanostructured materials towards practical photocatalytic applications. Herein, we demonstrate a general strategy to synthesize a series of uniform Ag_2WO_4/AgX (X = Cl, Br, I) hybrid nanorods by a facile in-situ anion exchange reaction between pregrown Ag_2WO_4 nanorods and different X^- ions in water at room temperature. Compared with single Ag_2WO_4 nanorods, further investigation has revealed that the as-prepared hybrid nanorods possess significantly enhanced photocurrent and enhanced photocatalytic activity in the degradation of methyl orange (MO) under visible-light irradiation. Especially, the as-prepared Ag_2WO_4/AgBr hybrid nanorods exhibit the highest photocatalytic activity among the three samples. Furthermore, the maximum production rate of •OH radicals is also confirmed by using the Ag_2WO_4/AgBr hybrid nanorods as photocatalyst in the photoreaction process.