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**Facile formation of metallic bismuth/bismuth oxide heterojunction on porous carbon
with enhanced photocatalytic activity**

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Abstract

Bismuth/bismuth oxide heterojunction on porous carbon ($\text{Bi}^0/\text{Bi}_2\text{O}_3@\text{C}$) was successfully prepared by a surfactant-assisted sol-gel method. This composite photocatalyst was fabricated by depositing Bi_2O_3 and metallic bismuth nanoparticles (NPs) on porous carbon sheets. Bi NPs were created by in-situ reduction of Bi_2O_3 with amorphous carbon. During the synthesis, bismuth and carbon precursors were mixed in different ratios, resulting in distinct amounts of metallic bismuth in the composites. The composites showed large specific surface area and pore volume as well as strong light absorption ability due to the existing carbon. In addition, the plasmonic bismuth NPs were found to behave as a noble metal, which is able to generate hot charge carriers under visible light irradiation. Photocatalytic performance of the $\text{Bi}^0/\text{Bi}_2\text{O}_3@\text{C}$ composites was investigated by

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