Microwave-Assisted Solvothermal Synthesis and Photocatalytic Activity of Bismuth(III) Based Metal-Organic Framework with difference organic linker

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We studied the effect of starting ligands such as H_2BDC, H_3BTC, and H_3TATB acids on the photocatalytic activity of three bismuth-based MOFs (Bi-MOF) obtained via a microwave-assisted solvothermal process. Different shape and size of ligands display different structure properties from the corresponding Bi-MOF. Specifically, Bi-TATB exhibits a largest specific surface area of 355 m^2/g and a stronger light absorption intensity with a wider range of visible light absorption and absorption edge is red shifted from that of Bi-BDC and Bi-BTC, suggesting the extension in the photocatalytic activity for Bi-TATB. This may facilitate the ligand-to-metal charge transfer and decrease electronic band gap of the Bi-TATB, thus contributing to the enhanced photocatalytic rate. The enhanced photocatalytic activity of Bi-TATB was further confirmed by the photodegradation of RhB under LED light irradiation, which is 99.1% of RhB removal after 180 min of light irradiation. With above understanding, Bi-MOF was finally used to the photocatalytic O_2 evolution from water under LED light irradiation.