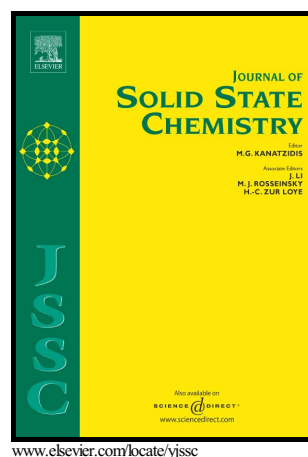


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Abstract: A series of novel binary TiO_2/BiOX ($\text{X}=\text{Cl}, \text{Br}, \text{I}$) and ternary $\text{TiO}_2/\text{CQDs}/\text{BiOBr}$ hybrid photocatalysts were prepared through a facile hydrothermal method. TiO_2/BiOX heterostructures were fabricated by varying the halogen ions. The photocatalysts were characterized by X-ray diffraction, scanning electron microscopy, transmission electron microscopy, UV-vis diffuse reflectance spectroscopy, and X-ray photoelectron spectroscopy. Among the binary TiO_2/BiOX , $\text{TiO}_2/\text{BiOBr}$ showed the most preferable photocatalytic activities due to suitable band gap alignment and photo stability, reaching almost 80% MO degradation during 180 min irradiation under simulated sunlight. Moreover, the effects of synthesis temperature, Ti/Bi ratio on the composition and structure were investigated, the results indicated $\text{TiO}_2/\text{BiOBr}$ with Bi/Ti=10% prepared at 120 °C possessed the best photocatalytic performance. Carbon quantum dots were introduced to accelerate electrons transfer at interface or prevent charges recombination on the surface, resulting a much better photocatalytic performance for $\text{TiO}_2/\text{CQDs}/\text{BiOBr}$ hybrid photocatalysts.

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