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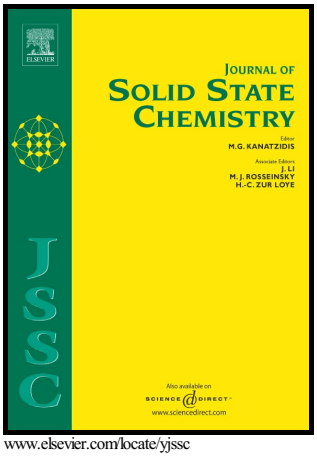

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A novel ternary TiO_2/CQDs/BiOX (X=Cl, Br, I) heterostructure as photocatalyst for water purification under solar irradiation

Xiaofei Qu, Meihua Liu, Junying Yang, Chunqi Wang, Huihui Meng, Shenggang Li, Liang Shi*, Fanglin Du

College of Materials Science and Engineering, Qingdao University of Science and Technology, Zhengzhou Road 53, Qingdao, 266042, China

Corresponding Author. E-mail address: shiliang@qust.edu.cn (Liang Shi)

Abstract: A series of novel binary TiO_2/BiOX (X=Cl, Br, I) and ternary TiO_2/CQDs/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, TiO_2/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 TiO_2/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 TiO_2/CQDs/BiOBr hybrid photocatalysts.