Haijin Liu et al., J Nanomater Mol Nanotechnol 2018, Volume 7
DOI: 10.4172/2324-8777-C7-038

Fabrication of binary heterojunction photocatalysts with enhanced photocatalytic activity

Haijin Liu, CW Du
Henan Normal University, China

Statement of the Problem: Photocatalytic technologies, as promising strategies for environmental control, have broad and attractive prospects for the degradation of water and air resident pollutants. However, most single photocatalysts possess some defects, such as narrow light absorption range, the high recombination rate of photo-induced electrons and holes and so on.

Methodology & Theoretical Orientation: In this study, binary heterojunction photocatalysts, SnS_2/Bi_2MoO_6 and SnO_2/BiOBr were synthesized by mild hydrothermal methods for the first time. The photocatalytic activities of these materials were evaluated through the degradation of a series of organic pollutants, which possess stable chemical structures, intense carcinogenicity, as well as being recalcitrant to degradation.

Findings: The experimental results indicated that the SnS_2/Bi_2MoO_6 and SnO_2/BiOBr composites exhibited significantly enhanced performance in contrast to pure Bi_2MoO_6, SnS_2, SnO_2 or BiOBr. In details, the degradation rate constant of CV (crystal violet) using 5 wt% SnS_2/Bi_2MoO_6 photocatalyst was 3.6 times that of the Bi_2MoO_6 and 2.4 times that of SnS_2; the degradation rate of RhB attained ~98.2% in 20 min. using 30 wt% SnO_2/BiOBr, which was close to twice that of pure BiOBr, and 10 times that of pure SnO_2. Furthermore, the primary active species in the photocatalytic oxidation process were detected via radical trapping experiments and ESR spectra.

Conclusion & Significance: Two photocatalytic mechanisms were proposed according to the different systems above to elucidate the improvement in photocatalytic efficiency. We trust that the work may provide further knowledge of the design and synthesis of advanced photocatalysts, as well as to inspire further applications of photocatalysts for water purification under visible light irradiation.

Biography

Haijin Liu got her Ph.D. degree in 2010 in environmental science. She works at Henan Normal University as an associate professor. She has been focused on the synthesis of new functional materials and their applications in the environmental area. She has fabricated various functional materials and applied them to adsorption, degradation, energy storage, disinfection, and so on. She worked deeply into the degradation processes and explored different mechanisms. As a visiting scholar, she collaborated with Dr. Aicheng Chen at Lakehead University in Canada during 2013-2014 and worked with Huijun Zhao at Griffith University in Australia in 2016. She hosted and participated in many Chinese projects and owned several Chinese patents.

031163@htu.edu.cn

Notes: