Fabrication of CdMoO4@CdS core-shell hollow superstructures as high performance visible-light driven photocatalysts

By: Madhusudan, P (Madhusudan, Puttaswamy)[1] ; Zhang, J (Zhang, Jun)[1] ; Cheng, B (Cheng, Bei)[1] ; Yu, JG (Yu, Jiaguo)[1,2]

View ResearcherID and ORCID

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Abstract

CdMoO4@CdS core-shell hollow microspheres with the diameter of 2-3 mm were synthesized through a simple ion exchange hydrothermal method by using CdMoO4 solid microspheres as the sacrificial template in the presence of thioacetamide (TAA). Based on the detailed investigation it was found that the concentration of TAA in the starting solution affects the size of the CdS nanosheets and the hollowing process. At the TAA concentration of 0.1 M, CdMoO4@CdS core-shell hollow spheres with a CdS nanosheet thickness of 50-100 nm were obtained. The formed CdS nanosheets have a hexagonal wurtzite structure and exhibit good size uniformity and regularity. Furthermore, the photocatalytic activity of the as-prepared samples was evaluated towards degradation of Rhodomine B (RhB) aqueous dye solution under visible-light. Compared to CdMoO4 microspheres, CdMoO4@CdS core-shell hollow microspheres show enhanced photocatalytic activity. The observed photocatalytic performance was attributed to the synergetic effects of composite morphology, pore structure, and exposed two-dimensional (2D) CdS nanosheets with dominant 001 facets in CdMoO4@CdS core-shell hollow microspheres. Furthermore, the growth mechanism of CdMoO4@CdS hollow microspheres was discussed in detail.

Keywords

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Author Information

Reprint Address: Yu, JG (reprint author)

+ Wuhan Univ Technol, State Key Lab Adv Technol Mat Synth & Proc, Luoshi Rd 122, Wuhan 430070, Peoples R China.

Addresses:

+ [1] Wuhan Univ Technol, State Key Lab Adv Technol Mat Synth & Proc, Wuhan 430070, Peoples R China

+ [2] King Abdulaziz Univ, Fac Sci, Dept Phys, Jeddah 21589, Saudi Arabia

E-mail Addresses: jiaguoyu@yahoo.com

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