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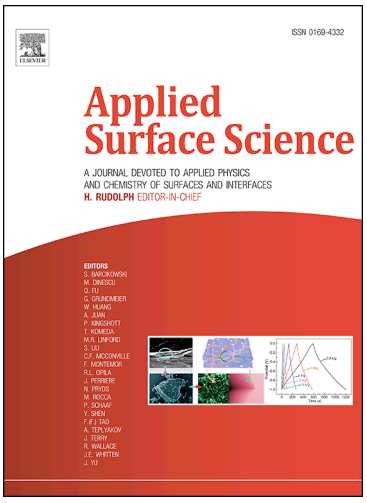

Effect of alkaline treatment on photochemical activity and stability of $Zn_{0.3}Cd_{0.7}S$

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Effect of alkaline treatment on photochemical activity and stability of $Zn_{0.3}Cd_{0.7}S$

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Abstract

The low photochemical activity and stability of sulphides photocatalysts still remain a big challenge for the practical application. In this work, a simple post-synthesis method is developed to partially remove zinc in the as-prepared $Zn_{0.3}Cd_{0.7}S$ sample, in which the unique amphiprotic nature of zinc is utilized mainly. Compared with the untreated $Zn_{0.3}Cd_{0.7}S$ sample (ZCS), the treated $Zn_{0.3}Cd_{0.7}S$ sample (V_{Zn}-ZCS) by alkaline solution has a 4.8 times higher BET surface area and contains more zinc vacancies. Under visible light irradiation ($\lambda \geq 420$ nm), the photochemical activity of V_{Zn}-ZCS is 1.8 times higher than that of ZCS for the degradation of MB. Moreover, compared with ZCS, V_{Zn}-ZCS shows an improved photostability after cycles, which is mainly attributed to the decreased VB oxidation potential by zinc vacancies. It is found that the formed zinc vacancy (V_{Zn}) can not only change the band structure, but also suppresses charge recombination as the hole