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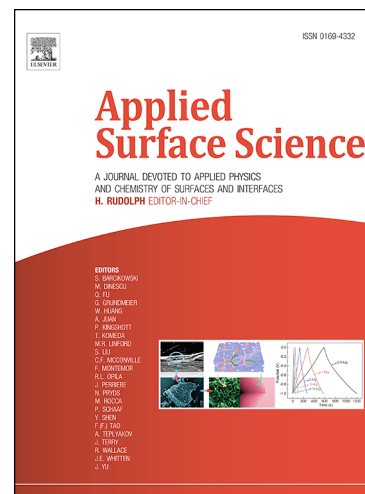
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Effect of alkaline treatment on photochemical activity and stability of $\text{Zn}_{0.3}\text{Cd}_{0.7}\text{S}$

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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 $\text{Zn}_{0.3}\text{Cd}_{0.7}\text{S}$ sample, in which the unique amphoteric nature of zinc is utilized mainly. Compared with the untreated $\text{Zn}_{0.3}\text{Cd}_{0.7}\text{S}$ sample (ZCS), the treated $\text{Zn}_{0.3}\text{Cd}_{0.7}\text{S}$ sample ($\text{V}_{\text{Zn}}\text{-ZCS}$) by alkaline solution has a 4.8 times higher BET surface area and contains more zinc vacancies. Under visible light irradiation ($\lambda \geq 420 \text{ nm}$), the photochemical activity of $\text{V}_{\text{Zn}}\text{-ZCS}$ is 1.8 times higher than that of ZCS for the degradation of MB. Moreover, compared with ZCS, $\text{V}_{\text{Zn}}\text{-ZCS}$ 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

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