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Photoelectrochemical Study of Nanostructured Acropora-Like Lead Sulfide Thin Films

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Abstract : In this paper, we report the fabrication and characterization of Acropora-like lead sulfide nanostructured thin films using chemical bath deposition. The method has the strong points of low temperature and no surfactant, comparing with the other method. The preferential growth directions of the broad branches were indexed as along (200) directions. The photoelectrochemical property of the as-deposited thin films was also investigated. Photoelectrochemical characterization was performed in the aim to determine the flat band potential (Vfb) and to confirm the n-type character of PbS, elucidated from the J(V) curves both in the dark and under illumination. The apparition of the photocurrent Jph started at a potential VON of −0.41 V/ECS and increased towards the anodic direction, which is typical of n-type behavior. The near infrared absorbance spectrum displayed an absorbance edge at 1959 nm, showing blue shift comparing to bulk PbS (3020 nm). These nanostructured lead sulfide thin films may have potential application as dispersed photoelectrode capable of generating H2 under visible light.

Keywords : lead sulfide, nanostructures, photo-conversion, thin films
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