Effect of silver doping on properties of chemical bath-deposited In_2S_3 for different solar energy applications

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The effect of Silver (Ag) doping on In_2S_3 nanoparticles properties and the potential of Ag-doped In_2S_3 in different solar energy applications have been investigated. In this study, the pure In_2S_3 and Ag-doped In_2S_3 were prepared using chemical solution process. The XRD results showed that's all the prepared nanoparticles has a polycrystalline cubic crystal structure. The XPS analysis results showed that all the prepared nanoparticles have an identical structure of In_2S_3. The photocatalytic ability of the pure In_2S_3 and Ag-doped In_2S_3 nanoparticles were investigated systematically and compared for the decomposition of methylene blue dye (MB), rhodamine b (RhB) and tetracycline (TC) under visible light illumination. Overall, the Ag-doped In_2S_3 exhibited better performance than pure In_2S_3 of visible-light photocatalytic degradation of TC, RhB and MB with higher removal efficiency. The performance of Ag-doped In_2S_3 in hydrogen production by photoelectrochemical (PEC) water splitting was studied. The results showed the Ag-doped In_2S_3 has more than three times higher STH efficiency than pure In_2S_3.