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SnS_x, Cu_2ZnSnS_4 Nanostructured Thin Layers for Thin-Film Solar Cells

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Abstract : Nanostructured thin films of SnS_x, Cu_2ZnSnS_4 (CZTS) semiconductors were fabricated by chemical processing to produce thin-film photoactive layers for photocells as a prospective lowest-cost and environment-friendly alternative to Si, Cu(In, Ga)Se_2, and other traditional solar cells materials. To produce SnS_x layers, the modified successive ionic layer adsorption and reaction (SILAR) technique were investigated, including successive cyclic dipping into Na_2S solution and $SnCl_2$, NaCl, triethanolamine solution. To fabricate CZTS layers, the cyclic dipping into $CuSO_4$ with $ZnSO_4$, $SnCl_2$, and Na_2S solutions was used with intermediate rinsing in distilled water. The nano-template aluminum/alumina substrate was used to control deposition processes. Micromorphology and optical characteristics of the fabricated layers have been investigated. Analysis of 2D-like layers deposition features using nano-template substrate is presented, including the effect of nanotips in a template on surface charge redistribution and transport.

Keywords : kesterite, nanotemplate, SILAR, solar cell, tin sulphide
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