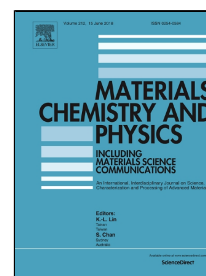


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On the Structure and Physical Properties of Methyl Ammonium Lead Iodide Perovskite Thin Films by the Two-step Deposition Method

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Abstract

In the present work, we synthesized methyl ammonium lead iodide perovskite ($\text{CH}_3\text{NH}_3\text{PbI}_3$) thin films using the two-step deposition technique. The method involves conversion of spin coated lead iodide (PbI_2) thin films by dipping in a solution of $\text{CH}_3\text{NH}_3\text{I}$ (MAI) followed by annealing. In this work, the samples were grown by varying the time of dipping and the concentration of MAI solution. The thin films formed were analyzed to determine their crystalline structure, morphology, elemental composition, chemical states and physical properties. The films showed tetragonal crystal structure with compact morphology. The elemental and the respective oxidation state implied the formation of $\text{CH}_3\text{NH}_3\text{PbI}_3$ thin films. Also, these thin films exhibited direct optical absorption, and the band gap values were in the range of 1.5-1.6 eV. The dark conductivity value of the films varied from $10^{-6} (\Omega \text{ cm})^{-1}$ to $10^{-4} (\Omega \text{ cm})^{-1}$ and all the thin films were photoconductive.

Keywords: Perovskites; thin films; spin coating; XRD; XPS.

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