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ACCEPTED MANUSCRIPT

Growth of different phases and morphological features of MnS thin films by chemical bath deposition: Effect of deposition parameters and annealing

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Abstract

Manganese sulfide thin films have been deposited on glass slides by chemical bath deposition (CBD) method. The effects of preparative parameters such as deposition time, bath temperature, concentration of precursors, multi-layer deposition, different source of manganese, different complexing agent and thermal annealing on structural and morphological film properties have been investigated.

The prepared thin films have been characterized using the X-ray diffraction (XRD), scanning electron microscopy (SEM) and energy dispersive X-ray analysis (EDX). It exhibit the metastable forms of MnS, the hexagonal γ -MnS wurtzite phase with preferential orientation in the (002) plane or the cubic β -MnS zinc blende with preferential orientation in the (200) plane. Microstructural studies revealed the formation of MnS crystals with different morphologies, such as hexagons, spheres, cubes or flowers like.

Graphical abstract

We report the preparation of different phases of manganese sulfide thin films (γ , β and α -MnS) by chemical bath deposition method. The effects of deposition parameters such as deposition time and temperature, concentrations of precursors and multi-layer deposition on MnS thin films structure and morphology were investigated. The influence of thermal annealing under nitrogen atmosphere at different temperature on MnS properties was also studied. Different manganese precursors as well as different complexing agent were also used.

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