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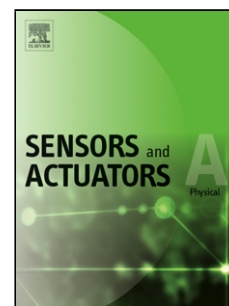
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X-ray sensing performance of ZnS:Cr film synthesised by a chemical bath deposition technique⁰

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Highlights

- The X-ray sensing performance of Cr doped ZnS film has been studied.
- The band gap decreased from 3.38 to 3.23 eV after doping of Cr.
- After doping, the conductivity of the film was increased by ~10 times.
- The detection sensitivity was little affected by doping.
- The *response-time* of the un-doped and doped films was similar.

Abstract

We report the X-ray sensing performance of Cr doped ZnS film synthesised by a chemical bath deposition technique and present a comparative study of the detection sensitivity between the Cr doped and an un-doped ZnS film. Due to doping of Cr in ZnS, the X-ray diffraction peaks of ZnS shifted towards higher diffraction angle, average crystallite size decreased and microstrain as well as the roughness of the films, increased. In addition, the band gap also decreased from 3.38 to 3.23 eV. *Current-voltage* characteristics of the films were studied under dark condition and under X-ray radiation. The doping of trivalent Cr in ZnS matrix offered excess electrons for conduction. As a result, the conductivity of the doped film was found to be ~10 times greater than that of the un-doped film. The doped films under X-ray give more current than the un-doped one. This makes the doped films more useful than the un-doped one. However, the un-doped film was found to be more effective to detect any change in energy of the X-ray radiation. Regarding response-time, the rise time of radiation induced current in the doped film is found to be 0.80 s which is shorter than that in the un-doped film. On the other hand, the decay time in the doped film is 1.67 s which is longer than that in the

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