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Cathodoluminescence and X-Ray Luminescence of ZnIn₂S₄ and CdGa₂S₄ Single Crystals

E. Arama, V. Pîntea, T. Shemyakova

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Abstract

Zinc thioindate and gallium thiogallate single crystals were grown by a chemical vapor transport method. The cathodoluminescence and X-ray luminescence spectra of ZnIn₂S₄ and CdGa₂S₄ single crystals were studied. From cathodoluminescence spectra of ZnIn₂S₄ at low temperatures the forbidden gap width of (2.96 ± 0.02) eV at 80 K and optical depth of the deep acceptor level $EA = (EV + 0.30)$ eV were determined. In the X-ray luminescence spectra of CdGa₂S₄ a single emission band is observed with an energy maximum at 2.14 eV and a slope within the high-energy range at approximately 2.34 eV identified as optical transitions of donor-acceptor type.

Keywords: ternary semiconductors, zinc thioindate, cadmium thiogallate, cathodoluminescence, X-ray luminescence, single crystals, optical transitions

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