

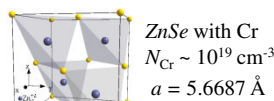
EPR STUDY OF PARAMAGNETIC DEFECTS IN ZnSe:Cr CRYSTALS

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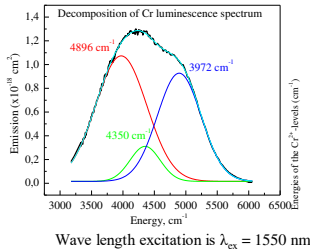
Introduction

ZnSe has received considerable attention due to its successful application in blue-green semiconductor lasers, mid-infrared lasers and other optoelectronic devices, doped with Cr²⁺, and Fe²⁺ have a significant lasing potential, demonstrated efficient, room-temperature lasing action near 2.5 μm, and have important potential applications in vibrational spectroscopy, trace gas detection, and medicine.

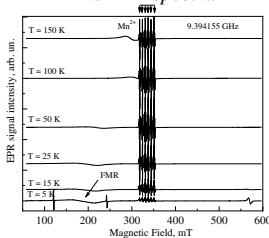
Results



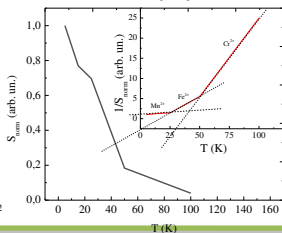
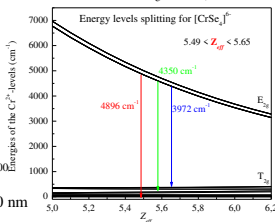
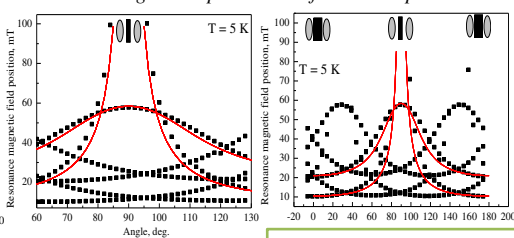
Synthesis: Bridgman method under excessive pressure of Ar



The EPR spectra



The angular dependences of the EPR spectra



Three linear portions with different slopes evidence there are three active magnetic subsystems each of them gives its specific contribution to the formation of the EPR spectrum.

Conclusion

The EPR spectra at $T > 15 \text{ K}$ consist of the intense line sextet with $g \sim 2.005$ and $A \sim 6.5 \text{ mT}$ due to hyperfine interaction with ⁵⁵Mn nuclei ($I = 5/2$) caused by Mn²⁺ ions along with a broad line with a linewidth of about 20 mT that varies its magnetic resonance position and intensity upon the temperature decrease. At 5 K, additional lines appear in the EPR spectrum of ZnSe:Cr. The spin Hamiltonian parameters $g_{\perp} = 1.98$, $g_{\parallel} = 1.961$, $D = -2.48 \text{ cm}^{-1}$, $a = 0.02 \text{ cm}^{-1}$. The symmetry of the center was taken as D_{2d} . Thus, the lines that appeared in the EPR spectrum at 5 K should be related to Cr²⁺ ions in ZnSe. The character of the angular dependence could hint that the Cr²⁺ ions are located in the interstitial sites. The luminescence study of Cr doped ZnSe shows Cr²⁺ is in a tetrahedral coordination complexes and the luminescence transitions arise between $E_g \rightarrow T_{2g}$ levels.

Acknowledgements

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