



Excitonic spectra and energy band structure of ZnAl_2Se_4 crystals

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<https://doi.org/10.1016/j.optmat.2015.09.035>

Abstract

Absorption, reflection and wavelength modulated reflection spectra were investigated in ZnAl_2Se_4 crystals. The energy positions of ground and excited states for three excitonic series (A, B and C) were determined. The main parameters of excitons and more precise values of energy intervals $V_1(\Gamma_7)-C_1(\Gamma_6)$, $V_2(\Gamma_6)-C_1(\Gamma_6)$, and $V_3(\Gamma_7)-C_1(\Gamma_6)$ were estimated. Values of splitting due to crystal field and spin-orbital interaction were calculated. Effective masses of electrons ($m_{C_1^*}$) and holes ($m_{V_1^*}$, $m_{V_2^*}$, $m_{V_3^*}$) were estimated. Reflection spectra contours in excitonic region were calculated using dispersion equations. Optical functions for $E > E_g$ from measured reflection spectra were assigned on the base of Kramers-Kronig relations.