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Birefringence of SnSe single crystals in excitonic and electronic transitions region

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Abstract

Absorption spectra in temperature range 300–10 K were studied. The minimal band gap A₁ (1.091 eV at 300 K) is formed by direct allowed in E||c polarization and forbidden in E||a polarizations transitions. The next interval B₁ (1.316 eV) is formed by direct transitions allowed in E||a polarization and forbidden in E||c polarization. Angular dependences of the electron transitions in the band gap minimum were investigated. Spectral dependences of refractive index (n) were calculated from wavelength modulation transmission ($\Delta T/\Delta\lambda$) and reflection ($\Delta R/\Delta\lambda$) spectra in the region of direct electron transitions. The absorption edge shifts to higher energies with temperature decreasing, and temperature coefficient of edge absorption shift (β) is 3.4×10^{-3} eV K⁻¹.