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The interference of birefractive waves in $ZnAl_2Se_4:Co^{2+}$ crystal

N. N. Syrbu, V. V. Zalamai, A. Tiron, I.M. Tiginyanu

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Abstract

The anisotropy of reflection, transmission and wavelength modulated reflection and transmission optical spectra of $ZnAl_2Se_4$ crystals doped by cobalt were investigated at 10 and 300 K. Intersections of refractive indices spectral dependences of ordinary and extraordinary waves (isotropic wavelengths λ_0, λ_{01}, λ_{02} and λ_{03}) were revealed in the region of electron transitions from Co^{2+} ions and in the depth of absorption band (λ_{04}, λ_{05}, λ_{06} and λ_{07}). It was found, that the spectral dependence $\Delta n = n(E \perp c) - n(E||c)$ intersects the zero axis in all values of isotropic wavelengths as in transmission region and in the depth of absorption band. The bands observed in reflection spectra of crystals in parallel and crossed polarizers at isotopic wavelengths have half-widths around 7–15 Å. Refractive indices in isotropic wavelengths change in 10^1–10^3 times. Narrow-band filters of different wavelengths could be created on the base of $ZnAl_2Se_4$ crystals doped by cobalt.

Keywords: birefractive effects, isotropic wavelength, refractivity, Kramers–Kronig analysis

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