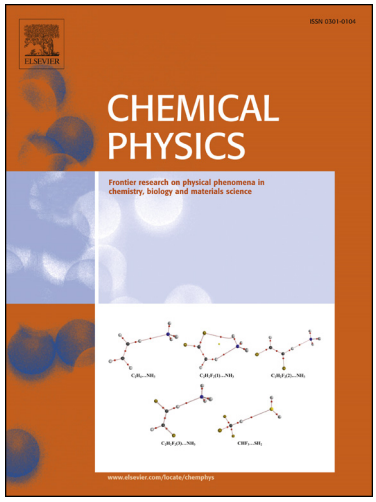

Spectroscopic properties of $ErAl_3(BO_3)_4$ single crystal

A.V. Malakhovskii, T.V. Kutsak, A.L. Sukhachev, A.S. Aleksandrovsky, A.S. Krylov, I.A. Gudim, M.S. Molokeev

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A.V. Malakhovskii*, T.V. Kutsak, A.L. Sukhachev, A.S. Aleksandrovsky, A.S. Krylov, I.A. Gudim, M.S. Molokeev.

L.V. Kirensky Institute of Physics, Siberian Branch, Russian Academy of Sciences , 660036 Krasnoyarsk, Russian Federation

*E-mail address: malakha@iph.krasn.ru

Telephone: 7-391-2498617, fax: 7-391-2438923.

Abstract

Single crystal of $ErAl_3(BO_3)_4$ was grown and its structure was studied. Polarized absorption spectra of $ErAl_3(BO_3)_4$ single crystal were measured in the spectral range 1670-330 nm (6000-30000 cm^{-1}). The Judd-Ofelt spectroscopic parameters have been determined: $\Omega_2=4.87\cdot10^{-20}$ cm^2, $\Omega_4=2.49\cdot10^{-20}$ cm^2, $\Omega_6=2.72\cdot10^{-20}$ cm^2. These parameters have been used to calculate the radiative transition probabilities, the multiplet luminescence branching ratios and the fluorescence life times of the manifolds. The luminescence spectra due to transitions $^2H_{11/2}\rightarrow{}^4I_{15/2}$ (526 nm), $^4S_{3/2}\rightarrow{}^4I_{15/2}$ (548 nm), $^4F_{9/2}\rightarrow{}^4I_{15/2}$ (662 nm), $^2H_{11/2}\rightarrow{}^4I_{13/2}$ + $^4I_{9/2}\rightarrow{}^4I_{15/2}$ (800 nm) and $^4S_{3/2}\rightarrow{}^4I_{13/2}$ (855 nm) were recorded in α, σ and π polarizations. The most intensive luminescence belonged to $^4S_{3/2}\rightarrow{}^4I_{15/2}$ transition (548 nm).

PACS: 78.20.-e, 78.40.Ha

Keywords: rare earth compounds; Er^{3+}; spectroscopic properties; Judd-Ofelt analysis; luminescence.