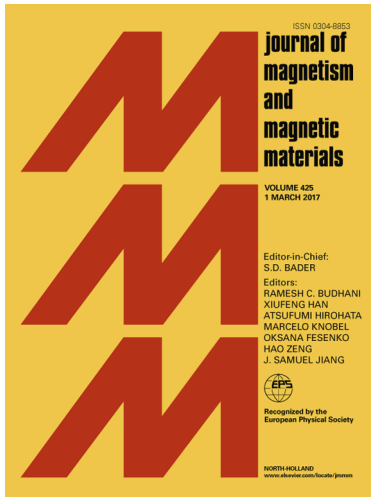

Research articles

Influence of the low local symmetry of Er^{3+} ions on magnetic circular dichroism and absorption spectra of *f-f* transitions in $ErFe_3(BO_3)_4$ single crystal

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Influence of the low local symmetry of Er^{3+} ions on magnetic circular dichroism and absorption spectra of *f-f* transitions in $ErFe_3(BO_3)_4$ single crystal

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Abstract

Linearly polarized absorption spectra and magnetic circular dichroism (MCD) spectra of $ErFe_3(BO_3)_4$ single crystal were measured in the range of 9000 – 23000 cm^{-1} at 90 K. The absorption spectra of *f-f* transitions were decomposed into the Lorentz shape components and intensities of the components were found. MCD spectra permitted us to measure the Zeeman splitting of some transitions and so to determine changes of the Landé factor along the C_3 axis of the crystal during these transitions. Optical and magneto-optical properties of *f-f* transitions in the $ErFe_3(BO_3)_4$ crystal were compared with those in the $ErAl_3(BO_3)_4$ crystal. Substantial difference of the properties connected with the difference of the Er^{3+} ions local symmetry in two crystals was revealed. Large splitting of one of the *f-f* transitions without magnetic field, which is not possible for the Kramers doublets, was observed. It was explained by appearance of two absorbing centers due to the local decrease of symmetry in the excited state. Appreciable difference of the local vibrations energy in some excited states was revealed.

Key words: Er^{3+} ion; *f-f* transitions; magnetic circular dichroism; rare earth ferroborates.

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