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MAGNETO-OPTICAL STUDIES OF Ni^{2+} IONS IN $BaLiF_3$

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The optical properties of Ni^{2+} ions, mostly in octahedral symmetry sites, have been studied since long time both for basic knowledge and for applications as efficient element for luminescence. In this work we have invesrigated a new perovskite crystal, $BaLiF_3$ doped with Ni^{2+}, by means of absorption, emission and MCD spectroscopy in the visible and infrared spectral regions.

The measurements were performed on samples with different Ni^{2+} concentrations at temperatures ranging from 300 to 2K. We have identified several absorption bands, and among them two are peaked at 680 and 1150 nm, having an halfwidth at RT of 0.84 and 0.29 eV respectively. They have been pumped by an He-Ne and a Nd-YAG lasers very efficiently, giving rise to an emission band at 1.5 um with an halfwidth of 0.17 eV at RT. Both absorption and emission bands do not show large lineshape variations upon cooling the samples to LHeT. Also the efficiency of luminescence is practically independent of temperature. On the contrary, at low temperatures, the various bands become structured and develop several no-phonon lines, which reflect the multiplicity of the energy levels involved in the transitions and probably the interaction of the ions with the phonon modes.

We have also measured the MCD spectra of the two absorption bands in the visible and in the near infrared and of the emission band at LHeT in magnetic fields up to 70 kG. Several structures of the bands have been evidentiated much more clearly than in absorption and emission. A carefull analysis of the MCD spectra should also give more information for the energy level assignement and the nature of the various transitions.

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