

Absorption spectrum and crystal-field analysis of U^{4+} ions in $CsCdBr_3$ single crystals.

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Streszczenie

Single crystals of $U^{4+}:CsCdBr_3$ were grown by the Bridgman–Stockbarger technique. It has been assumed, that U^{4+} ions are substituting two Cd^{2+} ions and possess the C_{3v} site symmetry. Thirty seven energy levels, located between 4000 and 25,000 cm^{-1} and encompassing all but the 1S_0 multiplet, were assigned from 7 K absorption spectra. The symmetry of the levels were determined on the basis of the observed small splitting of the Γ_3 doublets as well as by a comparison of low temperature absorption spectra of the $U^{4+}:CsCdBr_3$ with that previously reported for U^{4+} in Cs_2UBr_6 and Cs_2ZrBr_6 single crystals. A crystal-field analysis was performed by fitting eight atomic (in the orthogonal formalism) and 6 crystal-field parameters to the experimental Stark levels with an r.m.s. deviation of 100 cm^{-1} . The obtained values of the Hamiltonian parameters are discussed and compared with those reported in previous analyses of U^{4+} ions. The relatively strong crystal field, resulting in $N_v = 8530\text{ cm}^{-1}$ proves that in the $CsCdBr_3$ crystals the U^{4+} ions are located at a high symmetry site.

Adres publiczny

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