Crystal-field analysis of Eu^{3+} in Lu_2O_3.

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Streszczenie

Low temperature (7 K) absorption spectra of polycrystalline sintered ceramic Lu_2O_3:Eu^{3+} were recorded between 3950 and 50000 cm^{-1}. There are two different intrinsic Eu^{3+} sites, C_2 and S_6 (C_{3i}), in this host. A total of 105 crystal-field (CF) energy levels were assigned and fitted to a semiempirical Hamiltonian representing the combined free-ion (FI) and CF interactions for a $4f^6$ ion in the C_2 symmetry site. 10 FI and 14 CF parameters were varied simultaneously in the least square adjustments yielding an rms deviation between the calculated and experimental levels of 15 cm^{-1}. The CF strength parameter, S, obtained from calculated B_q^k parameters is larger for Lu_2O_3 when compared to the Y_2O_3 host, which is in accordance with the smaller ionic radius of the Lu^{3+} ion. The CF splittings of the $^7F_1$ and $^5D_1$ levels were also determined experimentally for the Eu^{3+} ion in the centrosymmetric S_6 site and the value of the second-rank B_0^2 CF parameter was calculated.

Adres publiczny

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