Crystal-Field Energy Levels of Trivalent Erbium Ion in Cubic Symmetry

Said Laachir[a], Mohamed Moussetad[b], Rahma Adhiri[b], and Ahmed Fahli[a]

[a] UFR S.I.R.I, Université Hassan II-Mohammedia Faculté des Sciences, Ben M'sik, B.P 7955 Casablanca, Morocco

[b] L.P.S.C.M, Université Hassan II-Mohammedia Faculté des Sciences, Ben M'sik, B.P 7955 Casablanca, Morocco

Reprint requests to S. L.; E-mail: saidlaachir@yahoo.fr

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This paper describes a scheme for the numerical calculation of crystal field (CF) energy levels and at the same time wave functions of the trivalent erbium ion in cubic symmetry. The 16-fold degenerate term $^4I_{15/2}$ of the trivalent erbium ion splits into three Stark quartets Γ_8 and two different doublets Γ_6 and Γ_7 (irreducible representations). The CF energy matrix of the Er^{3+} ion has been constructed and calculated from the complete diagonalization method, and the corresponding wave functions were used to calculate the ground state g-values. This method is outlined and illustrated by the examples of the Si:Er for comparison. The calculated g-factors are $g = 6.8$ and $g = 6.0$ for Γ_6 and Γ_7, respectively.

Key words: Crystal Field; Energy Level; Erbium; Rare Earth.