

Theoretical Explanations of the Optical and EPR Spectra for Tetragonal Yb^{3+} Center in KMgF_3 Crystal

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In this paper, the EPR g factors g_{\parallel} and g_{\perp} of Yb^{3+} and hyperfine structure constants A_{\parallel} and A_{\perp} of $^{171}\text{Yb}^{3+}$ and $^{173}\text{Yb}^{3+}$ in KMgF_3 crystal are calculated from the two-order perturbation formulae. In these formulae, the contribution of the covalence effects, the admixture between $J = 7/2$ and $J = 5/2$ states as well as the second-order perturbation are included. The needed crystal parameters are obtained from optical spectra. The calculated results agree reasonably with the observed values.

Key words: Electron Paramagnetic Resonance; Crystal-field Theory; Yb^{3+} ; KMgF_3 .