Investigation of the EPR Parameters of a Trigonal Dy\textsuperscript{3+} Center in La\textsubscript{2}Mg\textsubscript{3}(NO\textsubscript{3})\textsubscript{12} · 24H\textsubscript{2}O Crystal

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The electron paramagnetic resonance parameters $g_\parallel$ and $g_\perp$ of Dy\textsuperscript{3+}, and the hyperfine structure parameters $A_\parallel$ and $A_\perp$ of $^{161}$Dy\textsuperscript{3+} and $^{163}$Dy\textsuperscript{3+} in a La\textsubscript{2}Mg\textsubscript{3}(NO\textsubscript{3})\textsubscript{12} · 24H\textsubscript{2}O crystal are calculated by the perturbation formulas of the EPR parameters for a 4f\textsuperscript{9} ion in trigonal symmetry. In these formulas, the $J$-mixing among the $^6H_J$ ($J = 15/2, 13/2$ and $11/2$) states via crystal-field interactions, the mixtures of the states with the same $J$-value via spin-orbit coupling interaction and the interactions between the lowest Kramers doublet $\Gamma_\gamma$ and the same irreducible representations in the other 20 Kramers doublets $\Gamma_X$ via the crystal-field and orbital angular momentum (or hyperfine structure) are all considered. The crystal-field parameters for the studied Dy\textsuperscript{3+} center are obtained with the superposition model. The calculated results are in good agreement with the observed values.

Key words: Crystal-Field Theory; Electron Paramagnetic Resonance; Dy\textsuperscript{3+}; La\textsubscript{2}Mg\textsubscript{3}(NO\textsubscript{3})\textsubscript{12} · 24H\textsubscript{2}O.