

Defect Model of a Tetragonal Sm^{3+} Center Found from EPR Measurements in CaF_2 and SrF_2 Crystals

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Z. Naturforsch. **58a**, 373–375 (2003); received February 14, 2003

The EPR parameters (\mathbf{g} factors g_{\parallel} , g_{\perp} and hyperfine structure constants A_{\parallel} , A_{\perp}) of a tetragonal (C_{4v}) Sm^{3+} center in CaF_2 and SrF_2 crystals are calculated by considering the crystal-field J-mixing among the ground ${}^6\text{H}_{5/2}$, the first excited ${}^6\text{H}_{7/2}$ and second excited ${}^6\text{H}_{9/2}$ state multiplets. In the calculations the free-ion and crystal-field parameters of the tetragonal $\text{Sm}^{3+}\text{-F}^-$ center obtained from polarized laser-selective excitation spectroscopy are used. The calculated results suggest that the tetragonal $\text{Sm}^{3+}\text{-F}^-$ center is the Sm^{3+} center found by later EPR measurements. The \mathbf{g} factors g_{\parallel} , g_{\perp} and hyperfine structure constants A_{\parallel} , A_{\perp} of this EPR center are satisfactorily explained.

Key words: Defect Model; Electron Paramagnetic Resonance; Crystal-field Theory;
 Sm^{3+} ; CaF_2 ; SrF_2 .