

Electron-phonon Coupling in the $^4T_{2g}$ Excited Electron State of $Cs_2GeF_6:Mn^{4+}$

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In the present paper we report on an analysis of the fine structure of the first excited quartet $^4T_{2g}$ of Mn^{4+} ions which occupy the octahedral site in the Cs_2GeF_6 host crystal. The dynamic $^4T_{2g} \otimes (e_g + t_{2g})$ Jahn–Teller effect is considered in details, including the Ham effect of the reduction of the spin-orbit splitting and displacements of the ligands due to the combined effect of the a_{1g} and e_g normal modes of the $[MnF_6]^{2-}$ octahedral complex. The electron-phonon coupling constants are evaluated using the experimental spectroscopic data. The value of the Jahn–Teller stabilization energy $E_{JT} = 438 \text{ cm}^{-1}$ for the considered complex is estimated from both the Ham effect and the potential energy surface of the $^4T_{2g}$ excited state.

Key words: Laser Crystals; Electron-phonon Coupling; Jahn–Teller Effect.