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High-frequency EPR of Tb³⁺-doped KPb₂Cl₅ crystal

Shakurov G., Malkin B., Zakirov A., Okhrimchuk A., Butvina L., Lichkova N., Zavgorodnev V.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

High-frequency electron paramagnetic resonance (EPR) spectra of the KPb₂Cl₅:Tb³⁺ crystal have been investigated. Three types of spectra were observed in the frequency range of 74-200 GHz. The most intensive spectrum with the resolved hyperfine structure corresponded to transitions between sublevels of the ¹⁵⁹Tb³⁺ ground quasi-doublet with the zero-field splitting (ZFS) close to 48 GHz. Experimental results were analyzed by the exchange charge model of the crystal field affecting terbium ions in low-symmetry Pb²⁺ positions with the chlorine sevenfold coordination and the charge compensating vacancy in the nearest potassium site. The calculated values of g-factors and ZFS were in agreement with the experimental data. The nature of a broad EPR line with ZFS of about 180 GHz and of additional weak EPR lines observed as satellites of the main Tb³⁺ lines was discussed.
