

Luminescence of Tl⁺ ions in a KZnF₃ crystal

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Abstract

The luminescence spectra of a KZnF₃: Tl⁺ crystal are investigated in the energy range from 4.75 to 5.9 eV at temperatures of 10-300 K upon excitation into the A absorption band (5.7-6.3 eV). At T = 300 K, the luminescence spectra exhibit an intense band with a maximum at 5.45 eV, which is attributed to single Tl⁺ ions substituted for K⁺ ions. The 5.723-eV intense narrow band observed at T < 20 K is assigned to the 3Γ_{1u}-1Γ_{1g} zero-phonon transition, which is weakly allowed by the hyperfine interaction. The luminescence decay is studied as a function of temperature. The main characteristics of the luminescence spectra are adequately described in terms of the semiclassical theory based on the Franck-Condon principle and the Jahn-Teller effect for an excited sp configuration of the Tl⁺ ion with the use of the parameters obtained earlier from analyzing the absorption spectra of the system under investigation. © 2002 MAIK "Nauka/Interperiodica".

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