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Radiation defects creation in CsI(Tl) crystals and their luminescence properties

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Abstract

Radiation defect creation processes in CsI:Tl crystals have been studied. The model of color center, according to which Tl^0 is close to anionic vacancy, is considered. The absorption spectrum of $Tl^0V_a^+$ -center is a superposition of bands responsible for both transitions between the near activator exciton states and for those between the valent electron states in thallium atom perturbed by the anionic vacancy. Another center $Tl^+V_a^+$ may appear as a result of the $Tl^0V_a^+$ photoionization. Absorption bands at 3.44, 3.8, 2.64 eV of the electron trapping $Tl^+V_a^+$ in the center have exciton origin. $Tl^+V_a^+$ is also a luminescence center. The excitation in the absorption bands of this center luminescence is conditioned by the luminescence of the near activator excitons.

Keywords

Color center; Exiton luminescence; Defects; CsI:Tl crystal