

Thermoluminescence in single crystals of RbBr:OH⁻ and RbBr:Ca²⁺

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Abstract. Optical absorption, thermoluminescence glow and emission spectra of RbBr:Ca²⁺ and RbBr:OH⁻ have been studied and analysed. It is observed that both Ca²⁺ and OH⁻ ions enhance the *F*-centre concentration. *F*_{Z1} band in RbBr:Ca²⁺ appears at 1.55 eV. TL glow peak corresponding to *F*_{Z1} centre on analysis gives a trap depth of 0.84 eV. OH⁻ ions in the crystal seem to act as TL 'killers'. Spectral distribution of emission under the glow peaks shows five bands around 1.5, 1.8, 2.1, 2.5 and 2.9 eV. Probable models of TL mechanism are suggested to explain the observed TL emission bands.

Keywords. Thermoluminescence; RbBr:OH⁻; RbBr:Ca²⁺; optical absorption; emission spectra.

1. Introduction

Alkali halides have been a subject of investigation for a long time now. Their thermoluminescence (TL) characteristics have however been studied more systematically only during the last decade. Most of the work reported on these halides is on crystals grown under ordinary conditions, when the possibility of OH⁻ ions entering the lattice cannot be ruled out. The OH⁻ ions are known to influence optical absorption (e.g., Hartel 1970; Rolfe 1958), specific heat (Peressini *et al* 1969), dielectric constant (Kanzig *et al* 1964) and thermal conductivity (Chau *et al* 1966) of the host crystal. The effect of OH⁻ impurity on the TL properties has however not been studied.

Cationic divalent impurities when doped in alkali halides give rise to enhanced *F*-centre concentration and also some new optical absorption bands, called *F*_Z bands, on suitable optical and thermal treatments. Attempts have been made to correlate some of the TL glow peaks to these *F*_Z centres (Kos and Nink 1977; Radhakrishna and Chowdari 1972). However the mechanism responsible for TL emission is not yet clear. A study on spectral distribution of emission, observed under a glow peak can perhaps lead to a better understanding about the recombination processes involved.

With this in view the TL emission and optical absorption spectra of RbBr:Ca²⁺ and RbBr:OH⁻ are studied and the results reported in this paper.