

STUDIES ON GAMMA – IRRADIATED SODIUM TETRABORATE GLASSES CONTAINING YTTERBIUM

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ABSTRACT

A series of glass samples of $(\text{Na}_2\text{B}_4\text{O}_7)_{100-x} - (\text{Yb}_2\text{O}_3)_x$ were prepared by the usual melt quenching technique where x varied from 0 to 5 mol % .Optical absorption spectra were measured before and after gamma- irradiation of the glasses. Gamma-irradiation causes a shift of the fundamental absorption edge to longer wavelengths and induces a new absorption band around 550 nm for all glass compositions. The position of this band remains unaltered by increase in either the Yb_2O_3 content or the gamma-dose. A second band at 360 nm only appears for glasses doped with Yb_2O_3 ; its position remains unaffected by a storage time of 2500 h. The radio-thermoluminescence (RTL) curve for the base glass ($\text{Na}_2\text{B}_4\text{O}_7$) shows two peaks around 90 °C and 200 °C. The inclusion of Yb_2O_3 in the base glass causes a gradual suppression of the low temperature peak with increasing Yb_2O_3 concentration. At 4 mol% Yb_2O_3 , it disappears and the RTL curve subsumes a single well-defined peak at high temperatures. The RTL peaks tend to shift to higher temperatures with increase in Yb inclusions.

<http://journal.masshp.net/wp-content/uploads/Journal/2007/Jilid%201/A.A.%20Kutub%20191-202.pdf>

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