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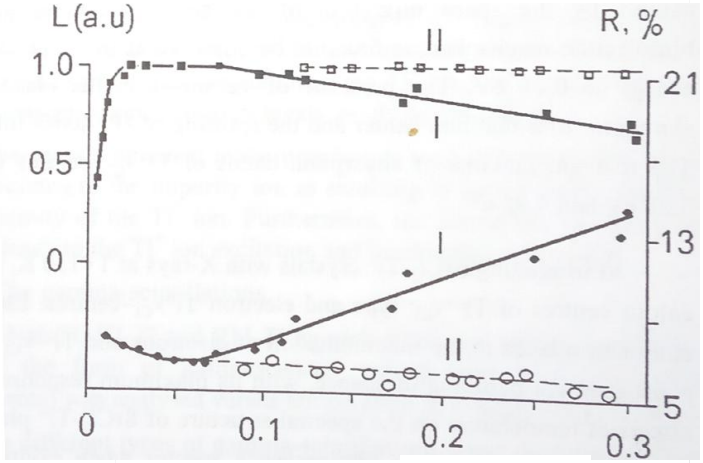
ACTIVATOR CONCENTRATION AND GROWTH CONDITIONS EFFECT ON SPECTROMETRIC PARAMETERS OF NaI(Tl) CRYSTAL

A.N. Panova and A. M. Kudin

Institute for Single Crystals, Kharkov Ukraine

Investigated were activator concentration (C) effect on light output (L) change, energy resolution (R), themoluminescent and luminescent properties of NaI(Tl) crystals grown by Stockbarger's technique in vacuum treated volume (I) and reaction gas atmosphere (II). The main results are given in the figure.

The following conclusions were made on the base of the carried out investigations. Unlike crystals I, crystals II are characterized by equilibrium activator distribution. In spite of excitation density, the main role in scintillation belongs to Tl^+-centers. Saturation of L(C) dependence is provided by sufficient concentration of Tl^+-centers for given excitation density. Concentration quenching of the L of crystals I is connected with



spinodal decay of solid solution and increasing of volume fraction (1–p) occupied by thallium aggregates. Dependence R(C) of crystals I is defined by both increasing (1–p) and fluctuation of inhomogeneity number, the size of which reaches several micrometers. Change R(C) of crystals II is connected with decreasing of disproportions of light output to electron energy.

The statistic comparison of detectors characteristics for gamma- and soft X-ray radiation indicates the high spectrometric quality of crystals II.