

Non-linearity in pulse cathodoluminescence and radioluminescence due to interactions between electronic excitations at their high densities

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Previously we proposed an experimental method for studies the scintillation non-linearity of wide-gap materials based on analysis of pulse cathodoluminescence (PCL) spectral and kinetic properties on parameters of an exciting electron beam [1]. In particular, this method allows to investigate the dependence of PCL parameters on the volume density of electronic excitations (EEs) created by the beam [1,2]. Using this method, we estimated the EE densities produced by an electron beam generated by a RADAN-EKSPERT accelerator [3,4] and the dependence of PCL parameters on the EE densities for different oxides and fluorides. For some materials, these results were compared with the data on radioluminescence non-linearity. Physical processes inducing the scintillation non-linearity at EE densities of $\sim 10^{18} \text{ cm}^{-3}$ and higher are discussed. The work is supported by Russian science foundation (project 19-79-30086-P).

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