

Time- correlated single photon counting technique in optical spectroscopy of MgAl₂O₄

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Time- correlated single photon counting (TCSPC) technique as a powerful analysis tool be used in fluorescence spectroscopy and imaging to measure the fluorescence lifetime of sample. In this report, by analyzing the decay curve of Al₂O₃ and MgAl₂O₄ single crystals irradiated by high energy Xe and Bi ions to several fluences. The measurements of the photoluminescence decay curves indicated lifetime increases with emission wavelength increasing in spectral range of 480-660 nm and decreases with ion fluence increasing.

It is suggested that reduction of the decay time with ion fluence is due to growing contribution of nonradiative processes that quench the luminescence yield. The dependence of characteristic lifetimes on registration wavelength is explained by the peculiarities of the charge-transfer processes between defects or defect impurity sites in radiative de-excitation.

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