

Effect of Ga³⁺ additions on the quantum cascade process in SrAl₁₂O₁₉:Pr³⁺

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Previously, we have determined that the main luminescence quenching process in the quantum cascade phosphor SrAl₁₂O₁₉:Pr³⁺ (SAP) was through photoionization of the Pr³⁺ 4f5d state into the conduction bands of SrAl₁₂O₁₉:Pr³⁺. This interaction between Pr³⁺ and the SAP conduction band states will be chemically modified through the substitution of Ga³⁺ for Al³⁺, which will reduce the host lattice bandgap. In this paper, we will investigate the effect of Ga³⁺ addition on the efficiency of the photon cascade process in SAP. Luminescence intensity and time resolved measurements as a function of temperature in combination with thermoluminescence excitation spectroscopy will be used to determine the changes in photoionization energy as the bandgap of SAP is reduced.

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