

# Defects by Design: Modulating the Spectral Response of Perovskite $\text{LaAlO}_3:\text{Fe}^{3+}$

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NIR LED emitters are widely used, among others, in medical diagnostics for deep tissue imaging and in therapies supporting tissue regeneration.  $\text{LaAlO}_3:\text{Cr}^{3+}$  is one of the highly efficient phosphors used in medical imaging with NIR LEDs [1]. Since the emission maximum of  $\text{Cr}^{3+}$  in the aforementioned material occurs at approximately 740 nm, the aim of this work was an attempt to synthesize a phosphor using the same  $\text{LaAlO}_3$  host matrix, which would exhibit an emission shifted further into the long-wavelength region of the spectrum. For this purpose,  $\text{LaAlO}_3$  doped with  $\text{Fe}^{3+}$  ions was obtained, and studies were conducted to investigate the effects of synthesis parameters and host structure modifications through co-doping with  $\text{B}^{3+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{Na}^+$ ,  $\text{Ga}^{3+}$ , or  $\text{Sr}^{2+}$  ions. The obtained results demonstrated that the position of the emission band maximum in the NIR region depends on the synthesis temperature, the ionic radius of the co-dopant relative to the substituted matrix ion, and the co-dopant concentration. This indicates that the investigated parameters allow for the modulation of the emission properties of the studied material within a certain range.

Financial support: NCN SONATA 20, UMO-2024/55/D/ST3/00785

[1] L. Lu, M. Sun, T. Wu, Q. Lu, B. Huang Chem. Commun., 2021,57, 9366-9369

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