

Phase Transition Luminescence Thermometry Based on $\text{LaAlO}_3\text{:Eu}^{3+}$

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Luminescence thermometry has garnered recently significant research interest due to its straightforward methodology, capacity for remote readout, electrically passive nature, and elevated reliability. Phase transition-based thermometers, renowned for their exceptional sensitivity to temperature fluctuations, have garnered significant attention in recent times [1,2]. Here in, the phase transition – based luminescence thermometry has been studied by utilizing $\text{LaAlO}_3\text{:1\%Eu}^{3+}$. Even small structural changes such as in LaAlO_3 (first order phase transition from rhombohedral to cubic) greatly affected the emission spectra as well as thermometric properties of Eu^{3+} . The phase transition temperature can be changed by modifying both the composition of materials and its morphology. In this work, the size of nanoparticles and the concentration of dopant ions in $\text{LaAlO}_3\text{:Eu}^{3+}$ on the thermometric properties of the phase transition – based thermometer will be investigated.

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[1] H. Suo, D. Guo, P. Zhao, X. Zhang, Y. Wang, W. Zheng, P. Li, T. Yin, L. Guan, Z. Wang, F. Wang, *Adv. Sci.* (2024) 11, 2305241.

[2] L. Marciniak, W. Piotrowski, M. Szalkowski, V. Kinzhybalo, M. Drozd, M. Dramicanin, A. Bednarkiewicz, *Chem. Eng. J.* (2022), 427, 131941.

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