

La_{0.4}Gd_{1.6}Zr₂O₇:0.1%Pr transparent sintered ceramic : a wide-range luminescence thermometer.

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Sintered transparent ceramics, presenting extraordinary resistance to thermal shocks, incomparably larger than glasses, glass ceramics, and single crystals, maybe valuable luminescence thermometers especially for high-temperature applications. The literature on that subject is, however, very much limited at present. In this paper, the performance of La_{0.4}Gd_{1.6}Zr₂O₇:0.1%Pr³⁺ sintered transparent ceramics as a luminescence thermometer was investigated. Temperature dependence of the intensity ratio of emissions from ³P₀ and ¹D₂ levels of the Pr³⁺ activator was found useful to measure temperature with reasonable relative sensitivity and accuracy over the 15–650 K range – one of the broadest achievable up to date. Time-resolved spectroscopy enabled distinct emissions from ¹D₂ and ³P₀ in the red part of the spectrum. This allowed achieving an impressive relative sensitivity of the La_{0.4}Gd_{1.6}Zr₂O₇:0.1%Pr luminescence thermometer which exceeded 0.81% K⁻¹ at 650 K.

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