

Electronic Supplementary Material (ESM) (if applicable)

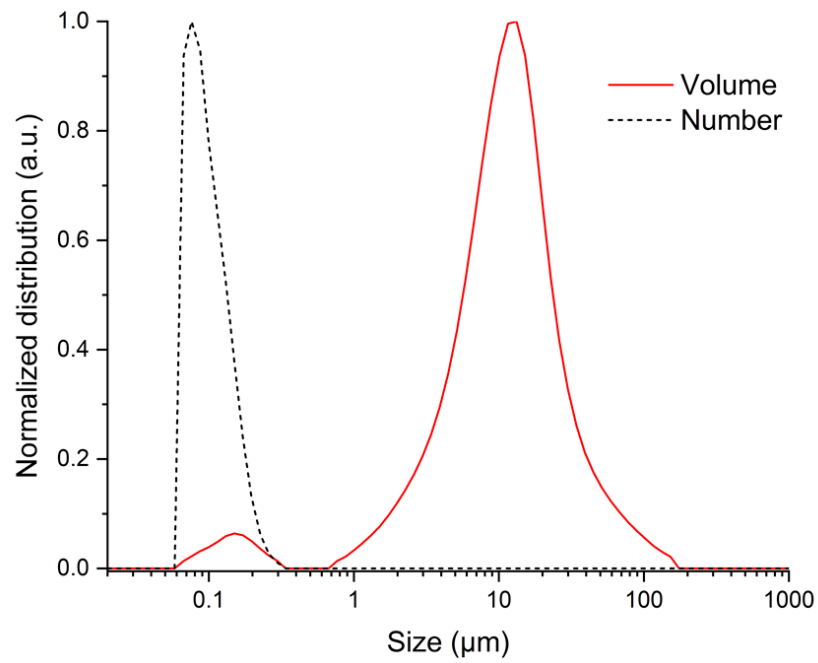


Figure SI-1: Comparison of particle size distribution (volume versus number) of ball-milled mixture fired 2 hours at 800°C.

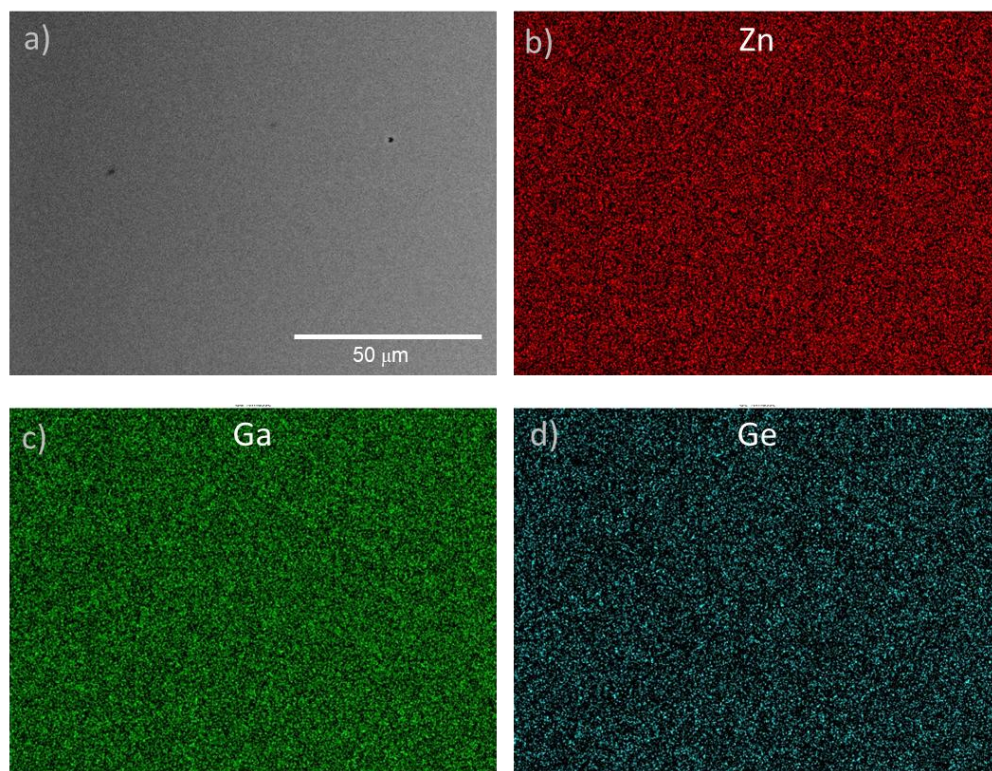


Figure SI-2: (a) SEM image of $\text{Zn}_{1.1}\text{Ga}_{1.8}\text{Ge}_{0.1}\text{O}_4$ transparent ceramic. (b-d) EDS mapping images of the same area.

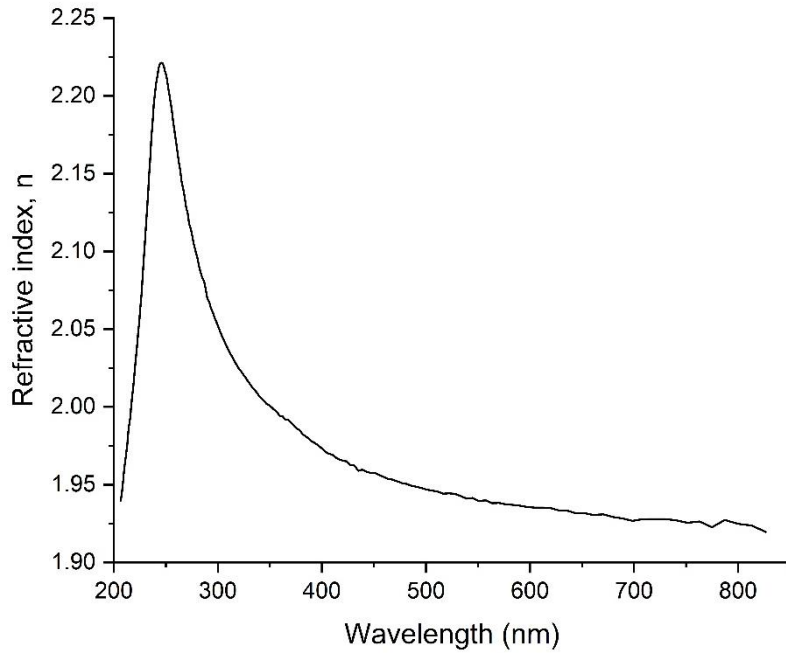


Figure SI-3: Refractive index n of $Zn_{1.1}Ga_{1.8}Ge_{0.1}O_4$ transparent ceramic as a function of wavelength.

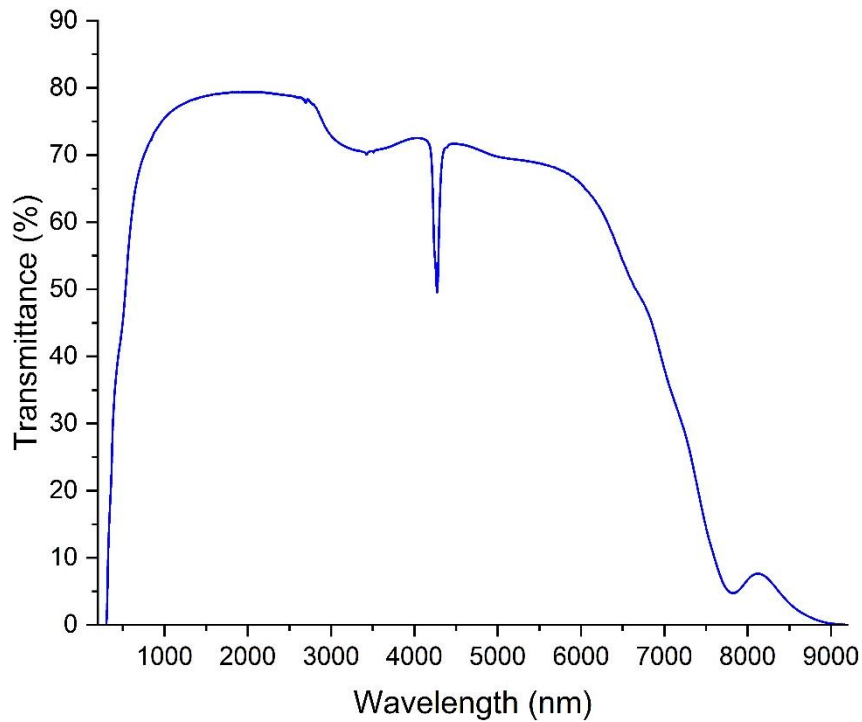


Figure SI-4: Optical transmittance spectrum of fine-grained $Zn_{1.1}Ga_{1.8}Ge_{0.1}O_4$ spinel ceramic with a thickness of 1.15mm. The sharp absorption band around 4.27 μm is observed and could be related to

trapped CO₂ gases [36] while the broad one located around 3 μm is due to the presence of free hydroxyl groups [63] probably exacerbated by the milling procedure conducted in ethanol media.

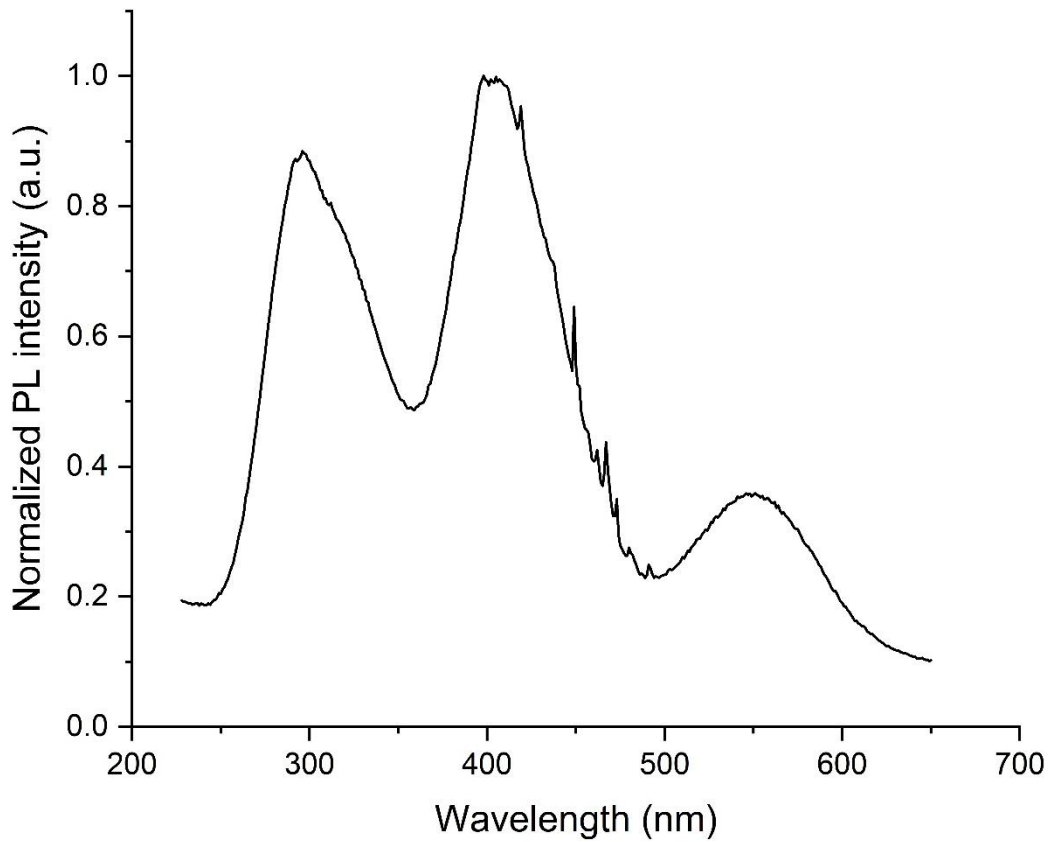


Figure SI-5: Excitation spectrum of Zn_{1.1}Ga_{1.8}Ge_{0.1}O₄ transparent ceramic doped with 0.1% Cr³⁺ associated to the emission at 694 nm (N₂ line). Please note that the observed sharp lines arise from the Xe lamp source; these are typical artifacts, frequently met in the 400 – 500 nm spectral range, despite the use of a FGL400 Long Pass Filter on the emission side.

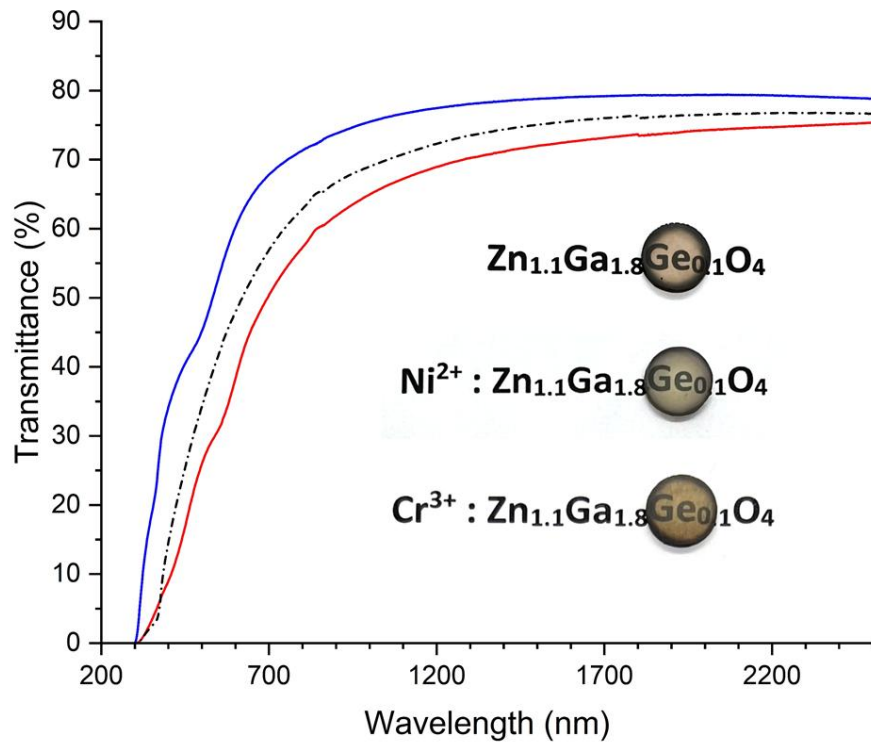


Figure SI-6: Transmission spectra measured through 1.15 mm thick samples for undoped $Zn_{1.1}Ga_{1.8}Ge_{0.1}O_4$ ceramic (blue) and ceramics doped with 0.1% of Cr^{3+} (red) and 0.05% Ni^{2+} (dashed black). The photographs of corresponding ceramics are presented.

Reference

- [63] Y. Abe, D.E. Clark, Determination of combined water in glasses by infrared spectroscopy, J. Mater. Sci. Lett. 9 (2) (1990) 244–245.