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SUPPORTING INFORMATION

Spectral and thermometric properties altering through crystal field strength modification in luminescent thermometers based on Fe^{3+} doped AB_2O_4 type nanocrystals (A=Mg, Ca, B=Al, Ga)

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KEYWORDS: iron, terbium, luminescence, crystal field,, spinel, luminescent nanothermometry

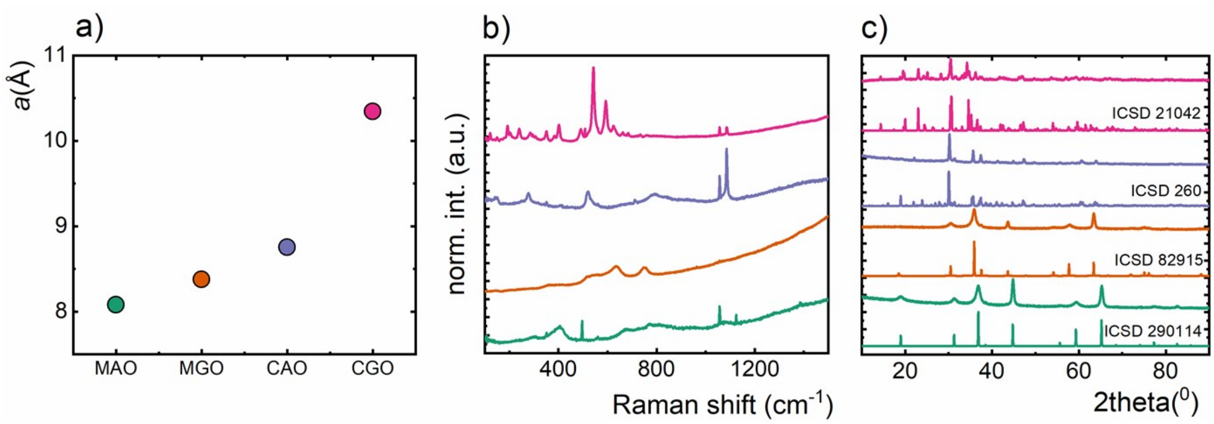

Figure S1. Calculated cell parameters for Fe^{3+}-doped spinel nanocrystals –a); Raman spectra of $MgAl_2O_4$, $MgGa_2O_4$, $CaAl_2O_4$ and $CaGa_2O_4$ nanomaterials doped with Fe^{3+} ions –b); XRD diffraction patterns of Fe^{3+}, Tb^{3+} - co-doped spinel nanocrystals –c).

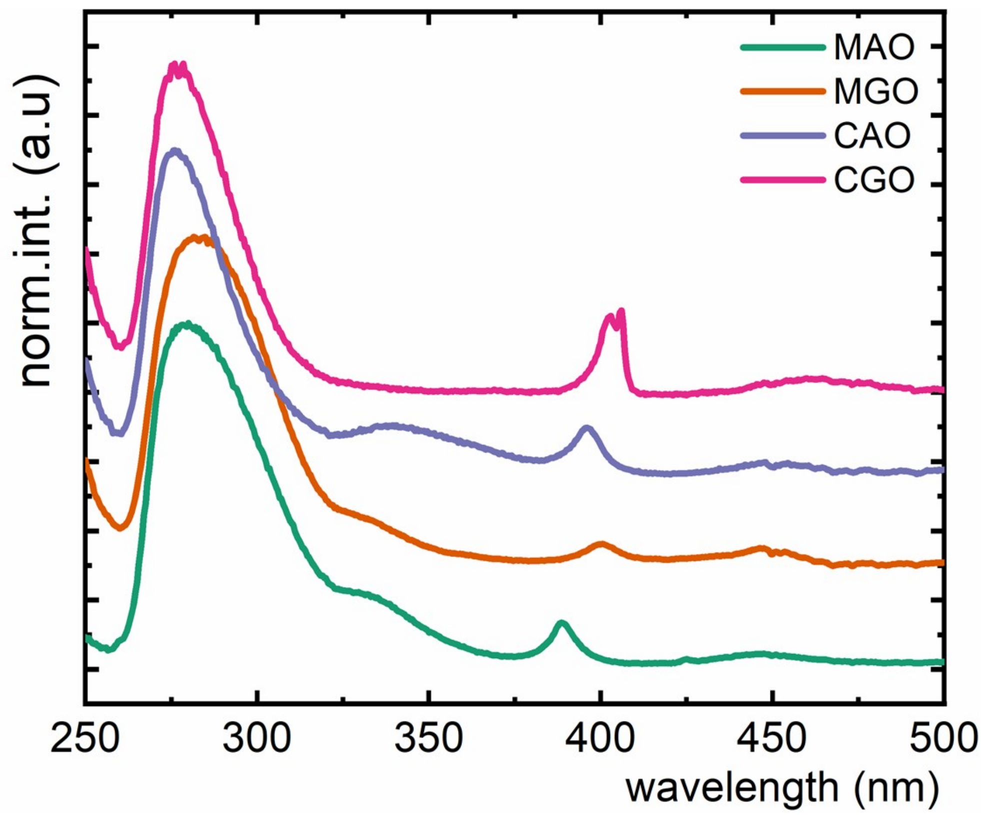

Figure S2. The excitation spectra of Fe^{3+} -doped spinel nanocrystals recorded at -150°C.

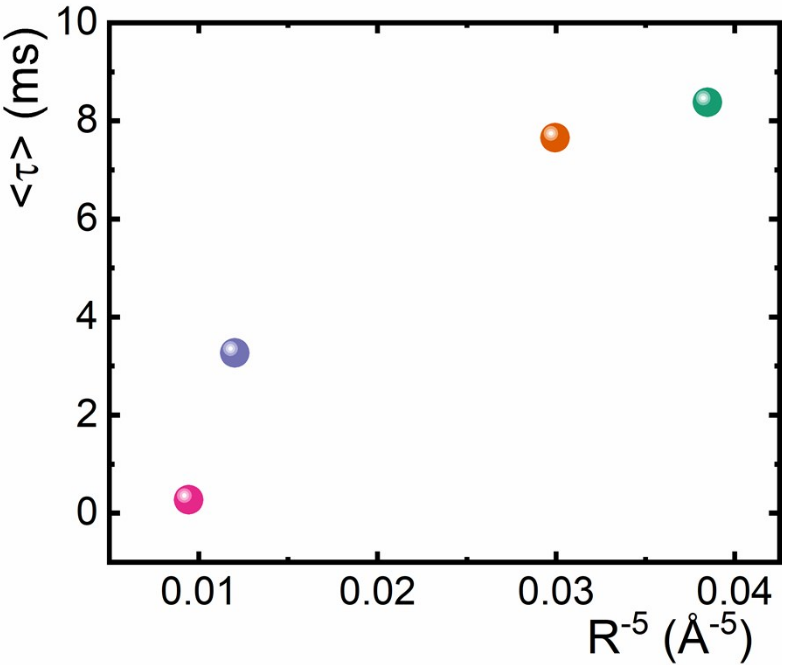

Figure S3. The average luminescence lifetime as a function of CFS.

$$\frac{-\Delta E_a}{k} \cdot \frac{1}{T} = \ln\left(\frac{I_o}{I_{em}} - 1\right) \qquad \text{(eq. S1)}$$

where I_o represents the initial emission intensity (at -150°C), k is Boltzmann constant

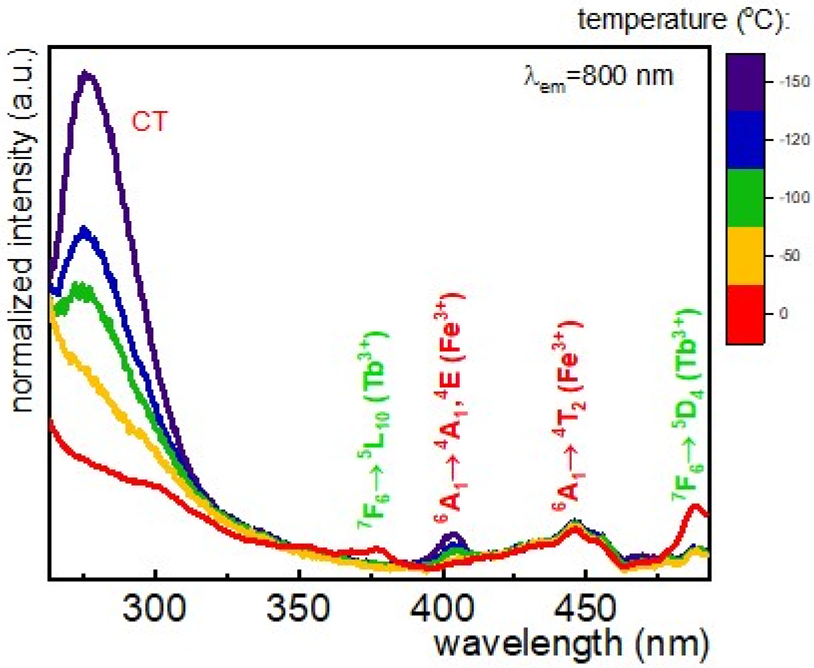

Figure S4. Thermal evolution of excitation spectra for representative CGO:Fe^{3+}, Tb^{3+} nanocrystals measured for Fe^{3+} luminescence (for λ_{em}=800 nm).

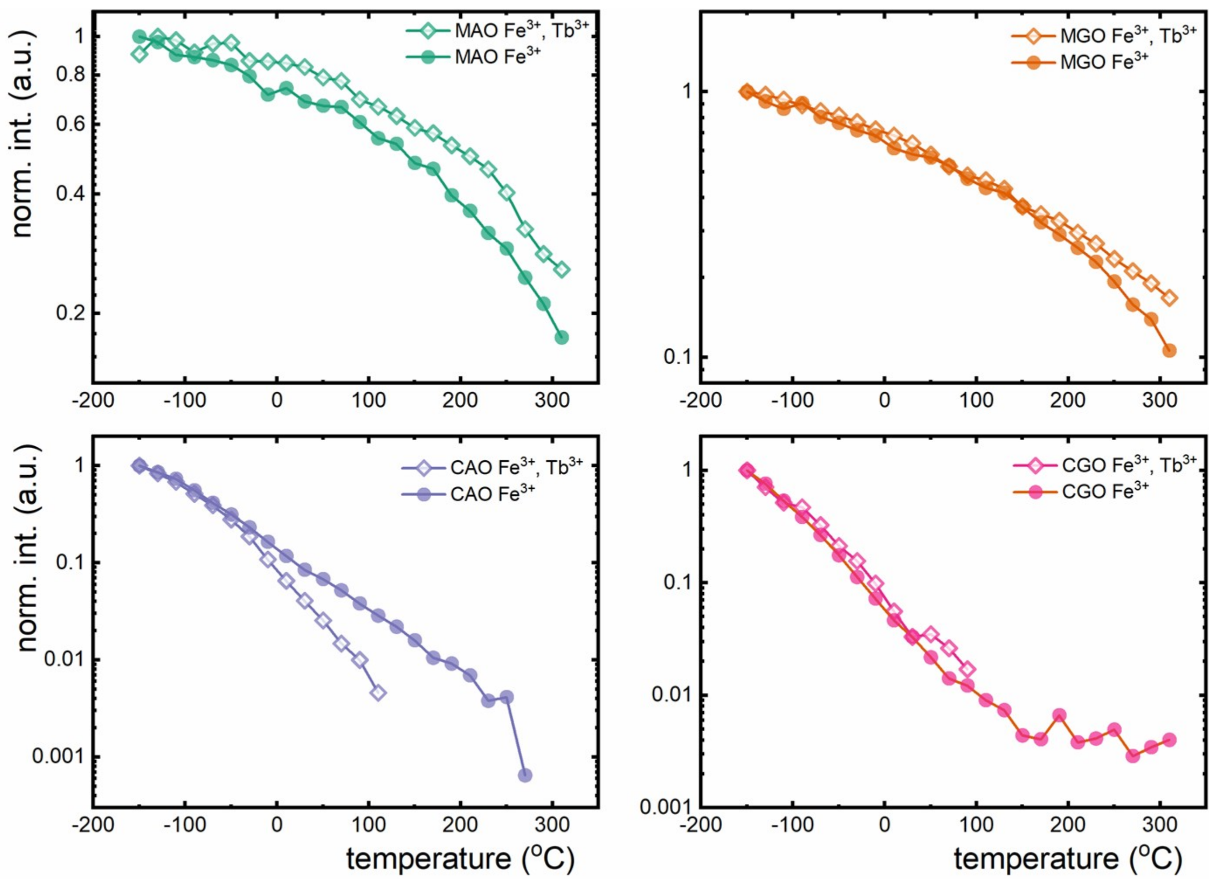

Figure S5. The thermally affected emission intensity of Fe^{3+} in the single Fe^{3+}-doped (circle) and Tb^{3+}-co-doped (square) spinel nanocrystals.

$$\delta T = \frac{1}{S_R} \cdot \frac{\Delta}{LIR} \qquad \text{(eq. S2)}$$

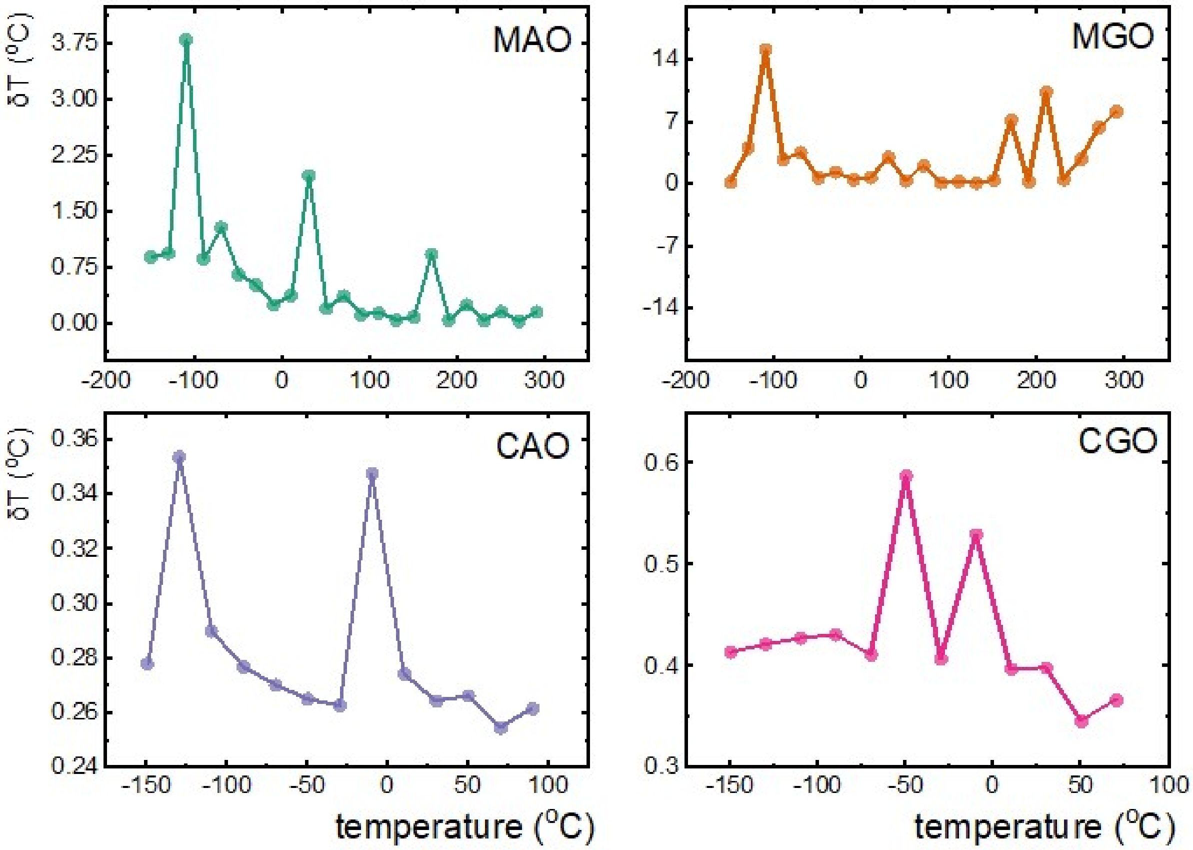

Figure S6. The uncertainty of temperature measurement using Fe^{3+},Tb^{3+} -doped spinel ratiometric luminescence nanothermometers.

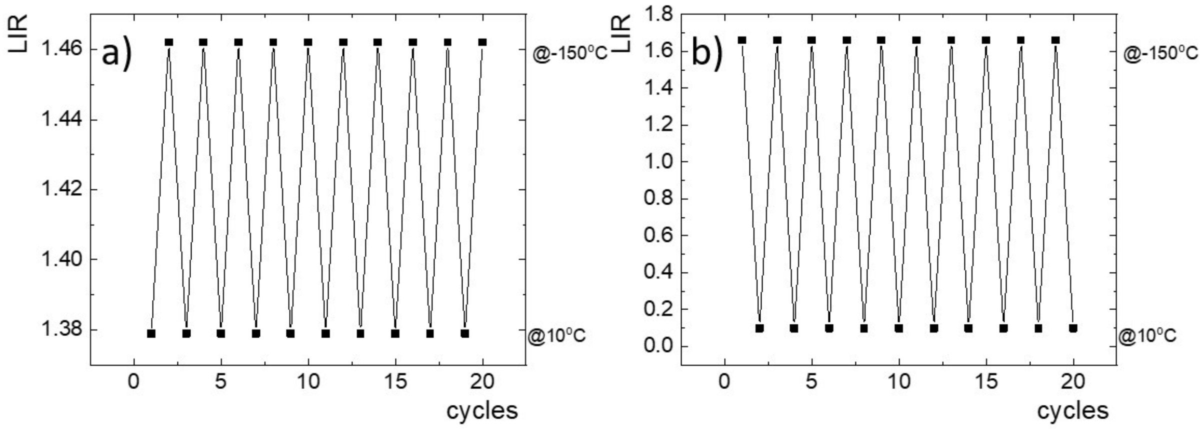

Figure S7. LIR values for several heating-cooling cycles for MGO-a) and CGO-b) nanocrystals