Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Electronic Supplementary Information

Dual-Activator Luminescence of RE/TM: $Y_3Al_5O_{12}$ (RE=Eu^{3+}, Tb^{3+}, Dy^{3+}; TM=Mn^{4+}, Cr^{3+}) phosphors for Self-Referencing Optical Thermometry

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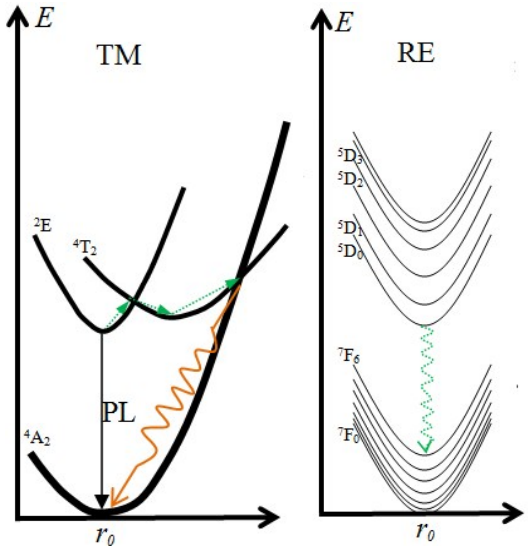

Figure S1 Configurational coordinate diagrams of TM (left) and RE (right) emitting centers in YAG host, showing the energy-level crossing relaxation (ELCR) quenching mechanism for TM activator and multi-phonon deexcitation (MPD) quenching for RE one.

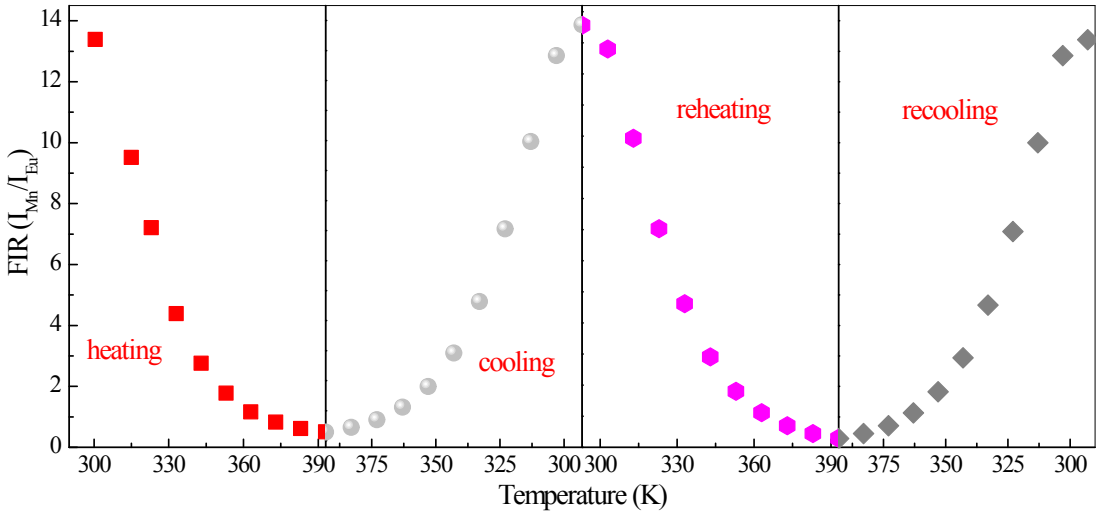

Figure S2 Plots of Mn^{4+}/Eu^{3+} FIR versus temperature measured on the cycling (heating/cooling and reheating/recooling) process.

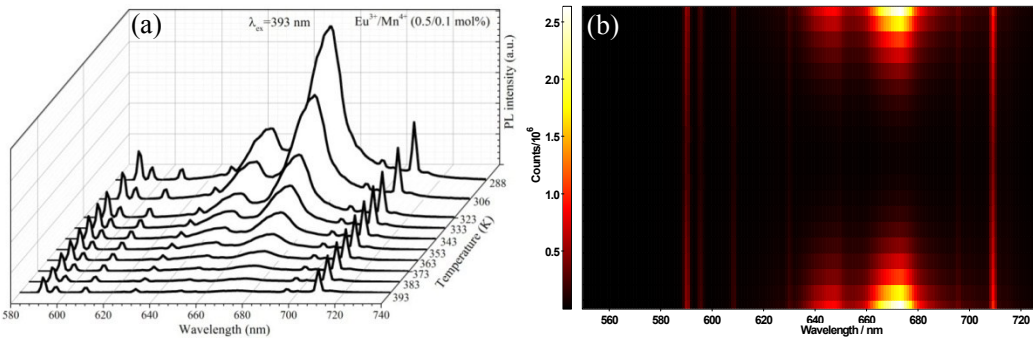

Figure S3 (a) Temperature-dependent PL spectra of Eu^{3+}/Mn^{4+} (0.5/0.1 mol%): YAG sample recorded from 288 K to 393 K. (b) Temperature-dependent emission mapping upon the cycling processes of heating and cooling over the temperature range from 288 K to 393 K.

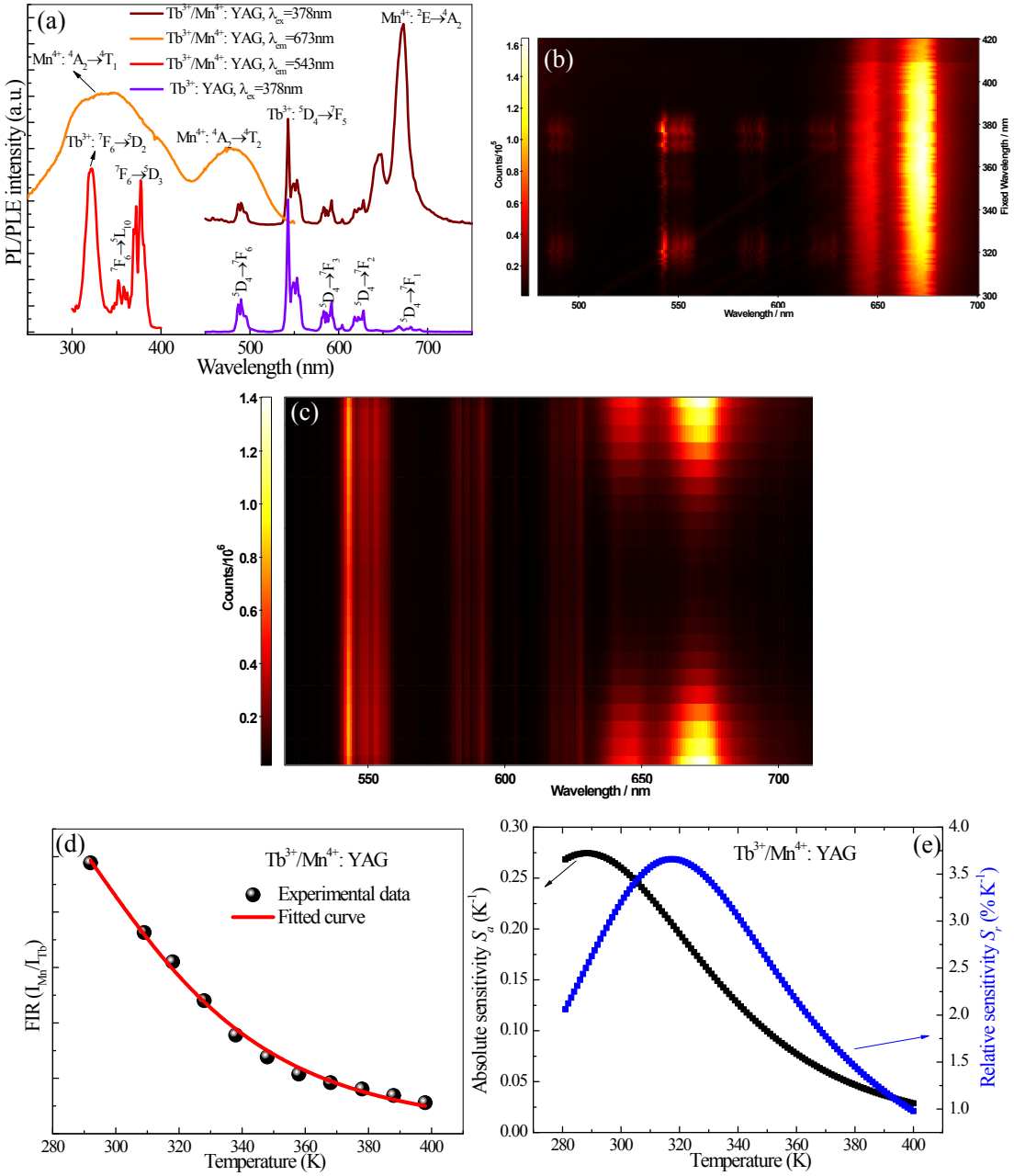

Figure S4 (a) PL and PLE spectra of Tb^{3+}: YAG and Tb^{3+}/Mn^{4+}: YAG products. (b) Excitation-wavelength-dependent emission mapping of Tb^{3+}/Mn^{4+}: YAG sample. (c) Temperature-dependent PL spectra of Tb^{3+}/Mn^{4+}: YAG sample recorded from 303 K to 393 K. Dependence of (d) experimental FIR and (e) the corresponding absolute sensitivity (S_a) and relative sensitivity (S_r) on temperature for the Tb^{3+}/Mn^{4+}: YAG sample.

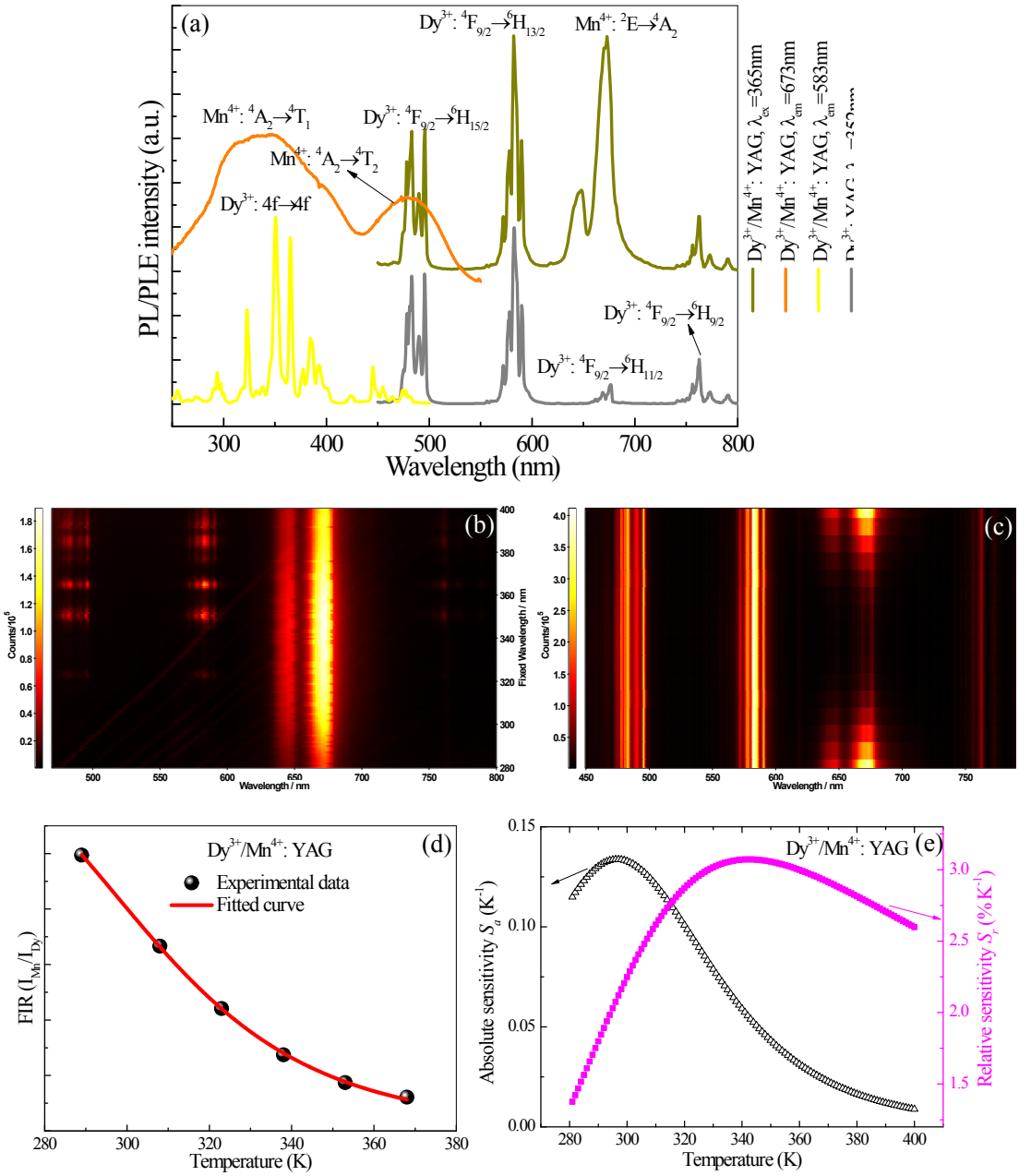

Figure S5 (a) PL and PLE spectra of Dy^{3+}: YAG and Dy^{3+}/Mn^{4+}: YAG products. (b) Excitation-wavelength-dependent emission mapping of Dy^{3+}/Mn^{4+}: YAG sample. (c) Temperature-dependent PL spectra of Dy^{3+}/Mn^{4+}: YAG sample recorded from 303 K to 393 K. Dependence of (d) experimental FIR and (e) the corresponding absolute sensitivity (S_a) and relative sensitivity (S_r) on temperature for the Dy^{3+}/Mn^{4+}: YAG sample.

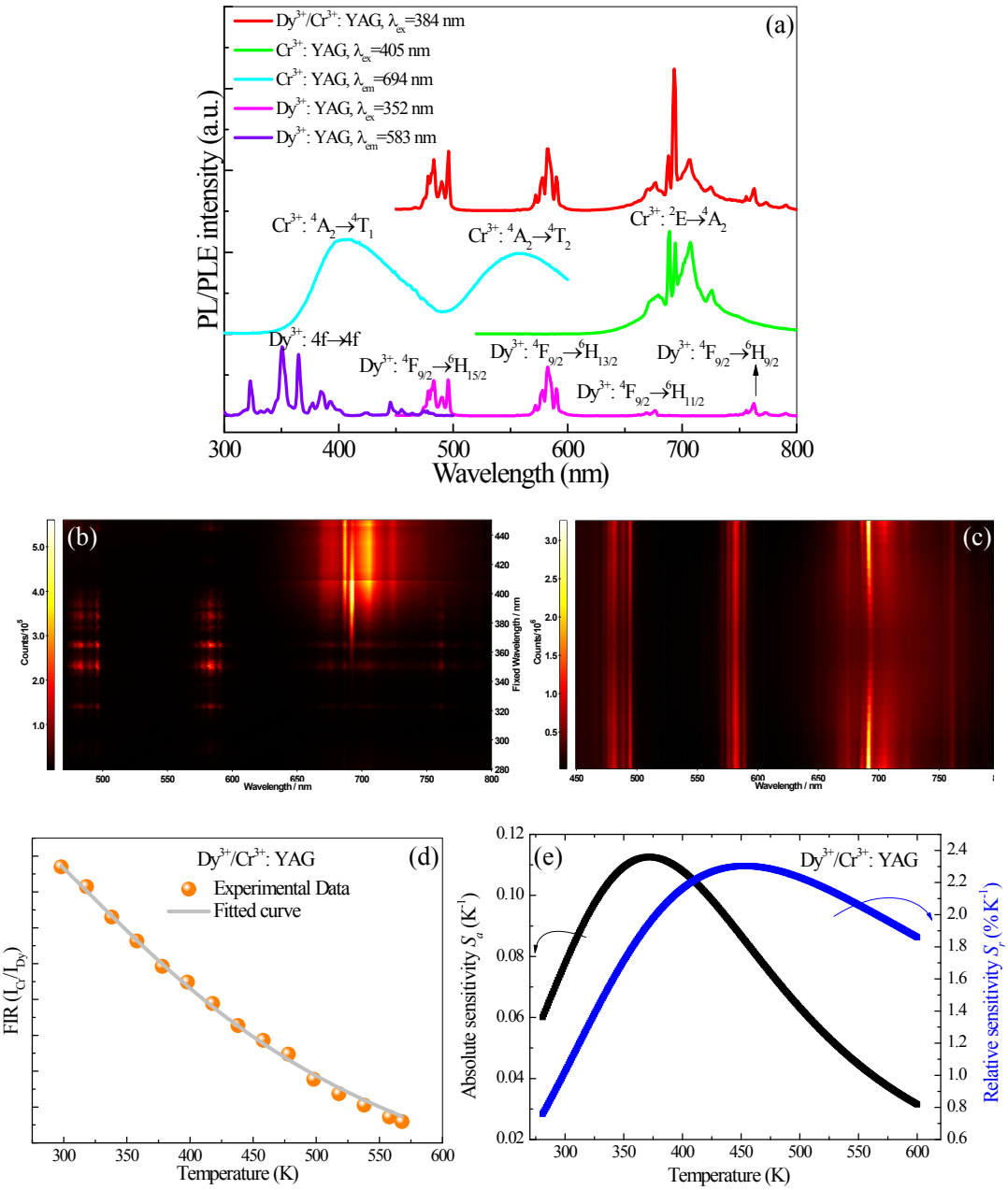

Figure S6 (a) PL and PLE spectra of Dy^{3+}: YAG and Dy^{3+}/Cr^{3+}: YAG products. (b) Excitation-wavelength-dependent emission mapping of Dy^{3+}/Cr^{3+}: YAG sample. (c) Temperature-dependent PL spectra of Dy^{3+}/Cr^{3+}: YAG sample recorded from 303 K to 393 K. Dependence of (d) experimental FIR and (e) the corresponding absolute sensitivity (S_a) and relative sensitivity (S_r) on temperature for the Dy^{3+}/Cr^{3+}: YAG sample.

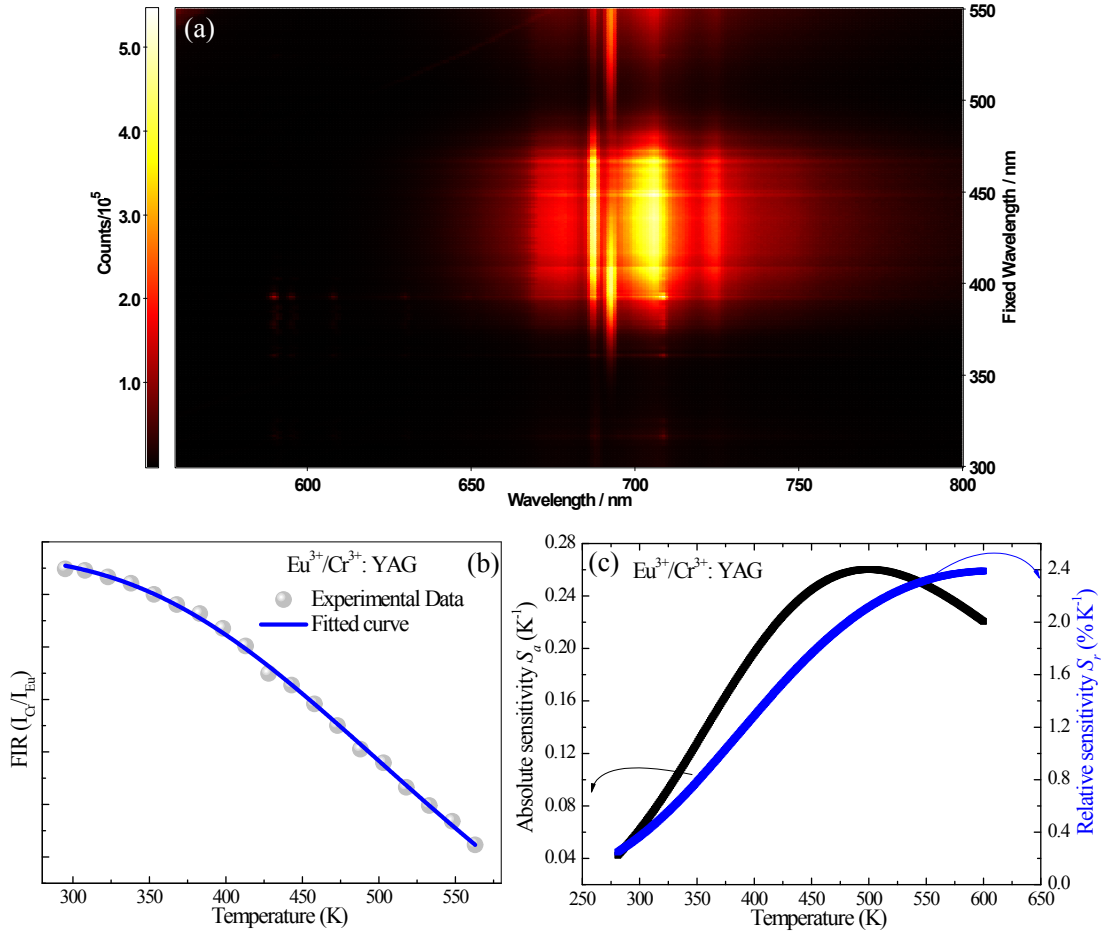

Figure S7 (a) Excitation-wavelength-dependent emission mapping of Eu^{3+}/Cr^{3+}: YAG sample. Dependence of (b) experimental FIR and (c) the corresponding absolute sensitivity (S_a) and relative sensitivity (S_r) on temperature for the Eu^{3+}/Cr^{3+}: YAG sample.