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

Supplementary materials

Li^+ incorporation and defects creation processes imposed by X-ray and UV irradiation in Li codoped $Y_3Al_5O_{12}$:Ce scintillation crystals

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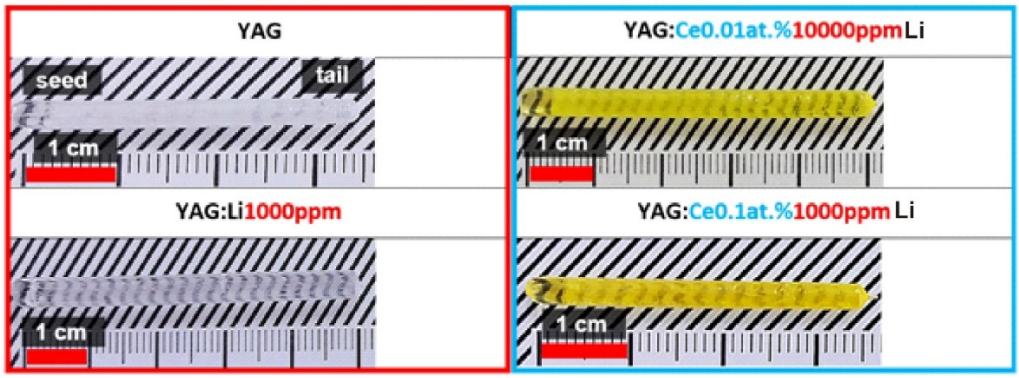

Fig. S1. Photographs of the as-grown undoped YAG, Li^+ doped YAG, and Li^+ codoped YAG:Ce crystals. The nominal concentrations of Ce^{3+} (0, 0.01 and 0.1 at.%) and of Li^+ (0, 1000 and 10000 ppm) are shown.

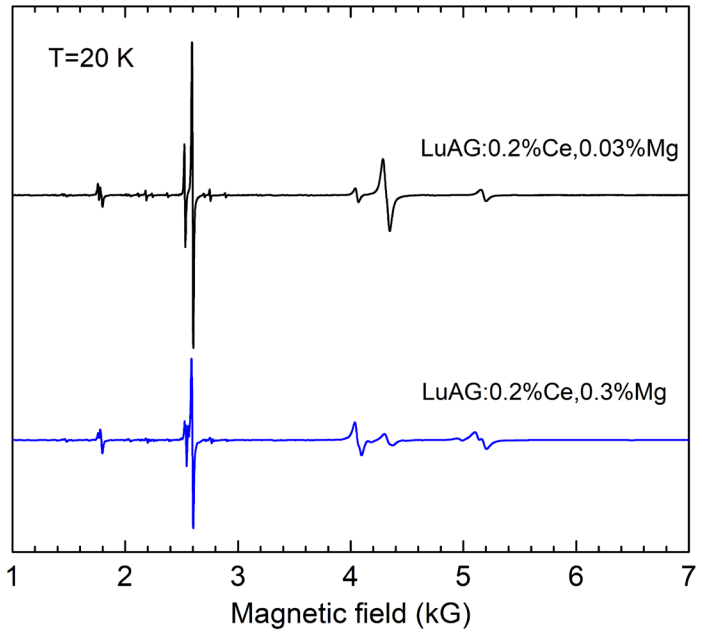

Fig. S2. Ce^{3+} EPR spectra in $Lu_3Al_5O_{12}$:0.2%Ce,0.03%Mg (LuAG:0.2%Ce,0.03%Mg) and $Lu_3Al_5O_{12}$:0.2%Ce,0.3%Mg (LuAG:0.2%Ce,0.3%Mg) demonstrating marked decrease of Ce^{3+} concentration on Mg codoping.

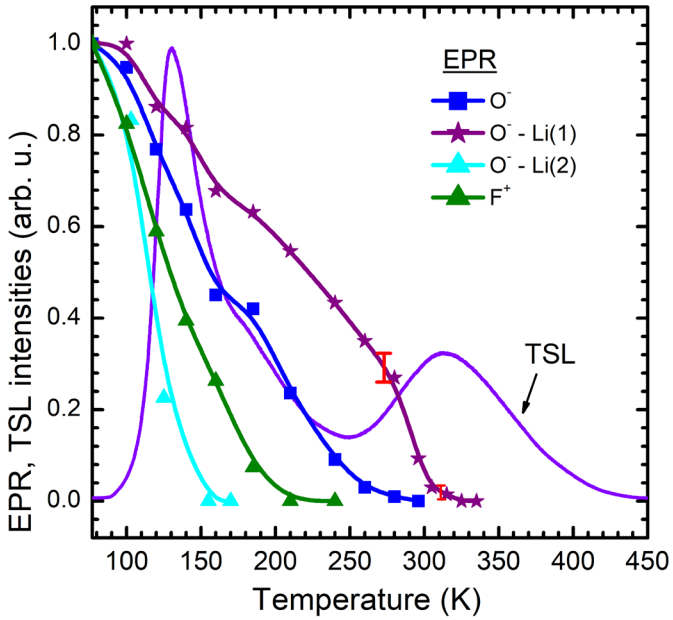

Fig. S3. Comparison of temperature dependences of the normalized EPR intensities of different centers with the TSL glow curve measured in YAG:0.1%Li sample.

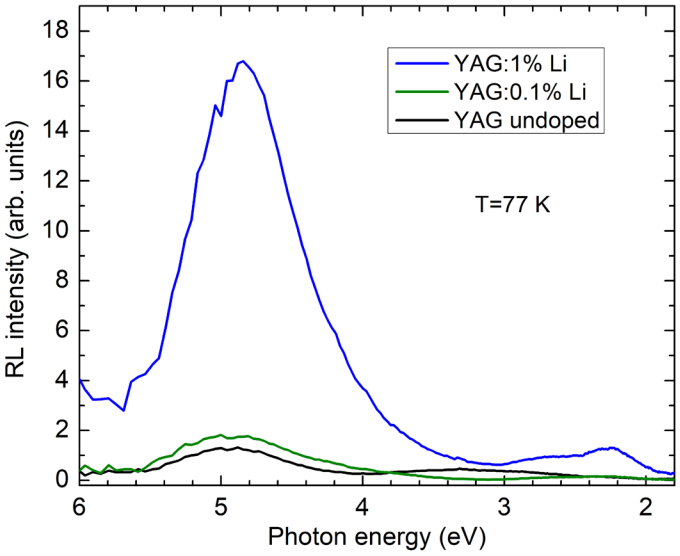

Fig. S4. X-ray excited luminescence spectra measured at 77 K in the undoped and Li-doped YAG crystals (YAG:0.1%Li; YAG:1.0%Li). The noticeable low-energy shift (on about 0.15 eV) of the X-ray-excited luminescence spectrum of YAG:1%Li (blue line) with respect to the spectra of YAG and YAG:0.1%Li (black and green lines, respectively) can be explained by the appearance in the former crystal of the luminescence of an exciton localized close to a Li^+ ion. The maximum of this emission band is located at about 4.8 eV.

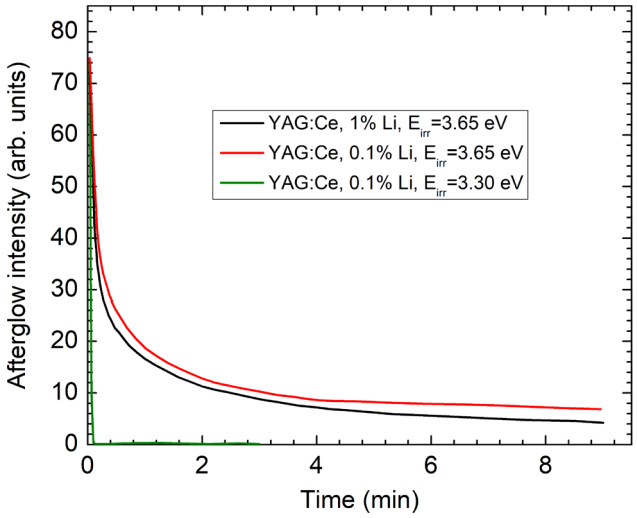

Fig. S5. Normalized afterglow decay curves measured at the same conditions at 85 K after irradiation of the YAG:0.1%Ce,1% Li (black line) and YAG:0.1% Ce,0.1% Li (red line) crystals with the same irradiation dose: E_{irr}=3.65 eV. The afterglow decay curve measured after irradiation of the YAG:0.1% Ce,0.1%Li crystal with E_{irr} = 3.3 eV (green line).

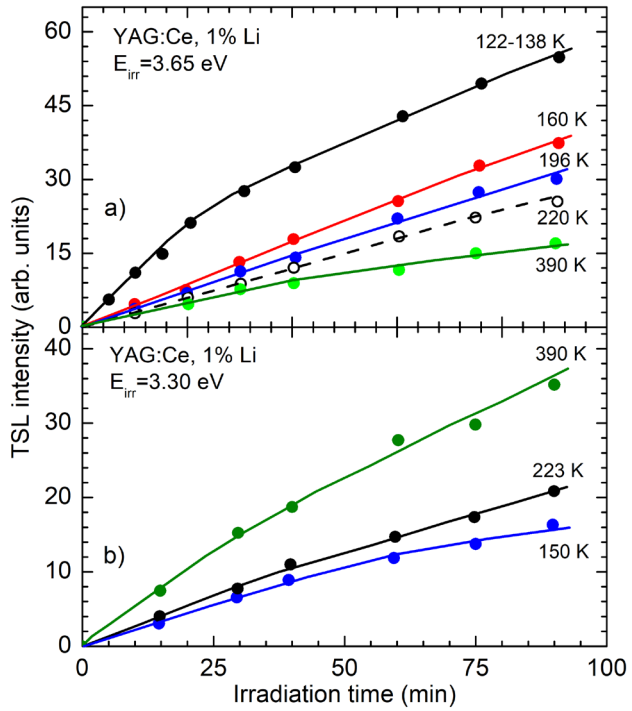

Fig. S6. Dependences of the TSL intensities on the irradiation duration t_{irr} (dose dependences) measured for the TSL glow curve peaks shown in the legends after irradiation of the YAG:0.1%,Ce,1.0% Li crystal at 85 K with (a) E_{irr} = 3.65 eV and (b) E_{irr} = 3.3 eV.