Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting Information

Title: Long persistent luminescence in the ultraviolet in Pb^{2+}-doped $Sr_2MgGe_2O_7$ persistent phosphor

Author(s): Yanjie Liang[a,c], Feng Liu[a,b], Yafei Chen[a,c], Kangning Sun[c] and Zhengwei Pan[a,b*]

[a] College of Engineering, University of Georgia, Athens, GA 30602, USA
[b] Department of Physics and Astronomy, University of Georgia, Athens, GA 30602, USA
[c] Key Laboratory for Liquid-Solid Structure Evolution and Processing of Materials, Shandong University, Jinan 250061, China
[*] Correspondence: e-mail: panz@uga.edu

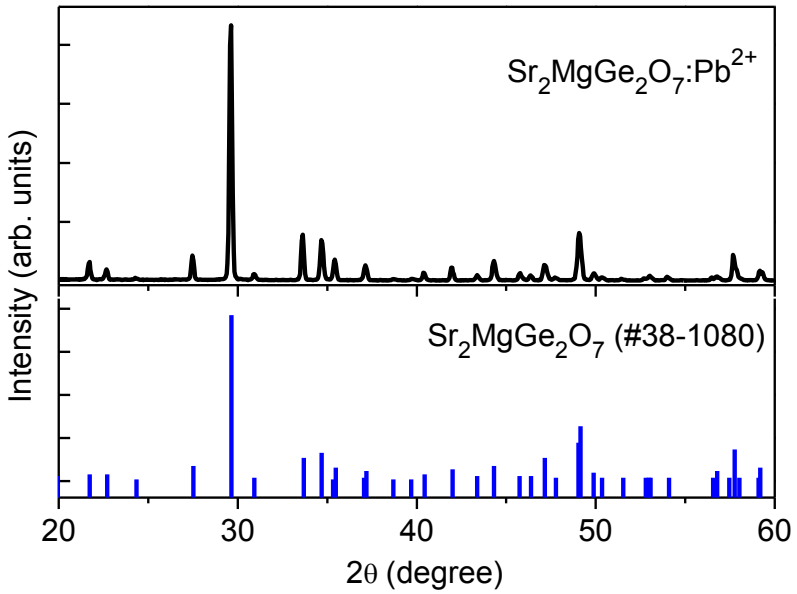

Figure S1. X-ray diffraction pattern of $Sr_2MgGe_2O_7$:0.5%Pb phosphor. The pattern was acquired on a PANalytical X'Pert Pro X-ray diffractometer using Cu $K\alpha_1$ radiation (λ = 1.5406 Å). The bottom pattern is the indexation of melilite-structured $Sr_2MgGe_2O_7$.

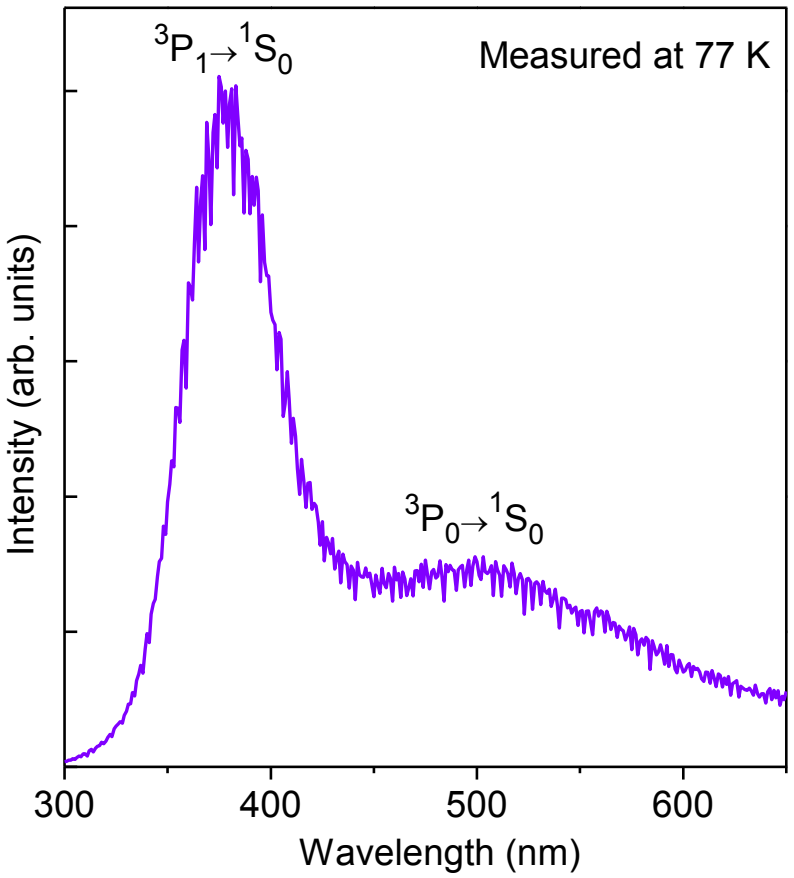

Figure S2. Photoluminescence emission spectrum of $Sr_2MgGe_2O_7:Pb^{2+}$ persistent phosphor acquired under 280 nm light excitation at 77 K.

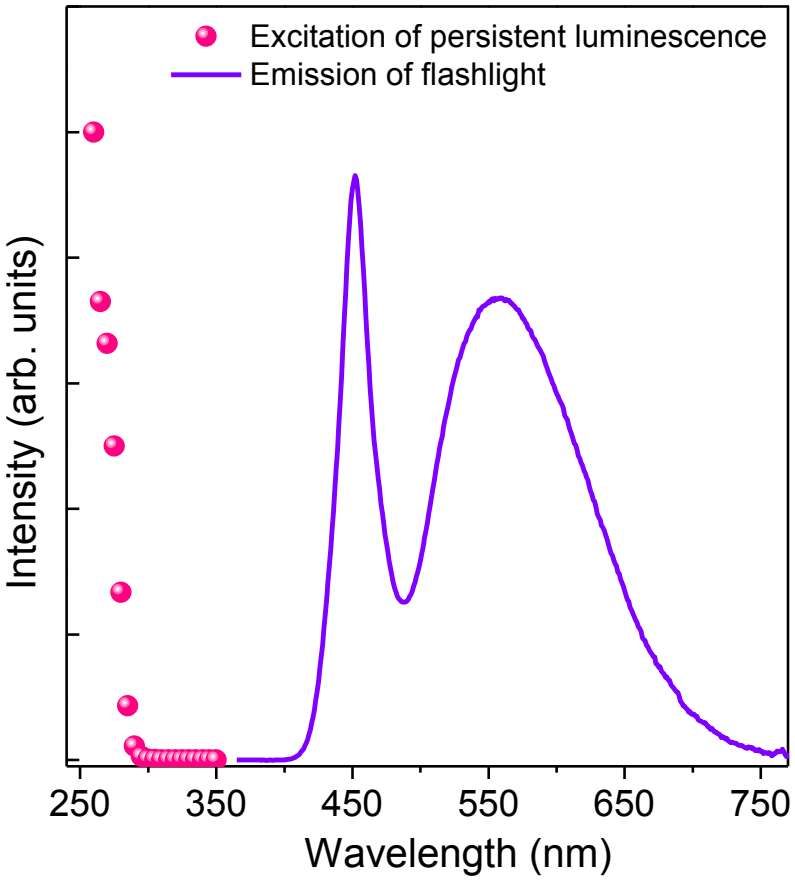

Figure S3. Emission spectrum of the white LED flashlight used in PSPL study. The flashlight is a YAG:Ce-based white LED with a output of ~1 mW/cm^2. The dots curve is the persistent luminescence excitation spectrum of the $Sr_2MgGe_2O_7:Pb^{2+}$ phosphor, which is the same as the one in Fig. 2b. It is clear that the white LED cannot produce persistent luminescence in $Sr_2MgGe_2O_7:Pb^{2+}$.

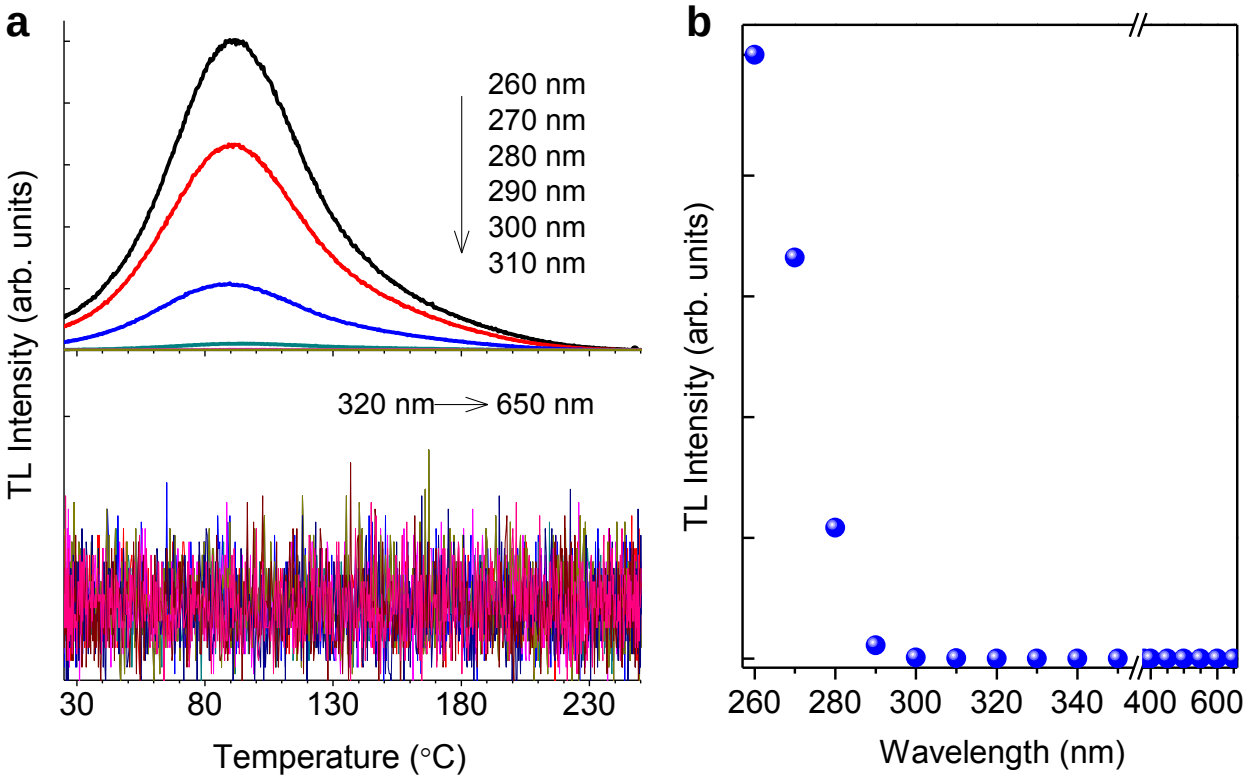

Figure S4. Thermoluminescence (TL) curves and trap filling spectrum of $Sr_2MgGe_2O_7:Pb^{2+}$ persistent phosphor. (a) TL curves acquired after the excitation with monochromatic lights with different wavelengths between 260 nm and 650 nm in 10 nm steps. The excitation duration is 300 s for each excitation wavelength. The monitoring wavelength is 370 nm. (b) Trap filling spectrum obtained by plotting the TL intensity in (a) as a function of the excitation wavelength. The trap filling spectrum is identical in shape to the persistent luminescence excitation spectrum in Fig. 2b. This is because the physical meanings of trap filling spectrum and persistent luminescence excitation spectrum are same even through they were obtained by different methods. Both of them reveal the energy needed to photoionize the localized electrons from Pb^{2+} to the conduction band.