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

Persistent luminescence warm-light LEDs based on Ti-doped RE_2O_2S materials prepared by rapid and energy-saving microwave-assisted synthesis

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Supporting Information

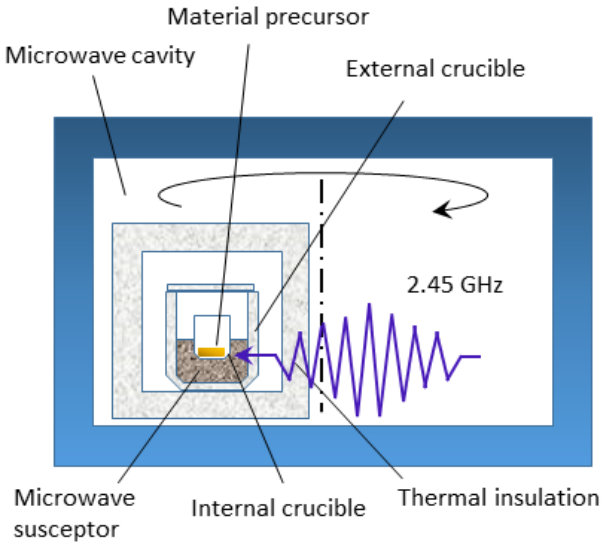

Figure S1. Microwave-assisted solid-state synthesis setup to obtain the oxysulfide materials. Both external and internal crucible are made from alumina. The microwave susceptor used was granular carbon. The thermal insulation is a low-density aluminosilicate brick. All the materials were prepared in a conventional domestic microwave oven.

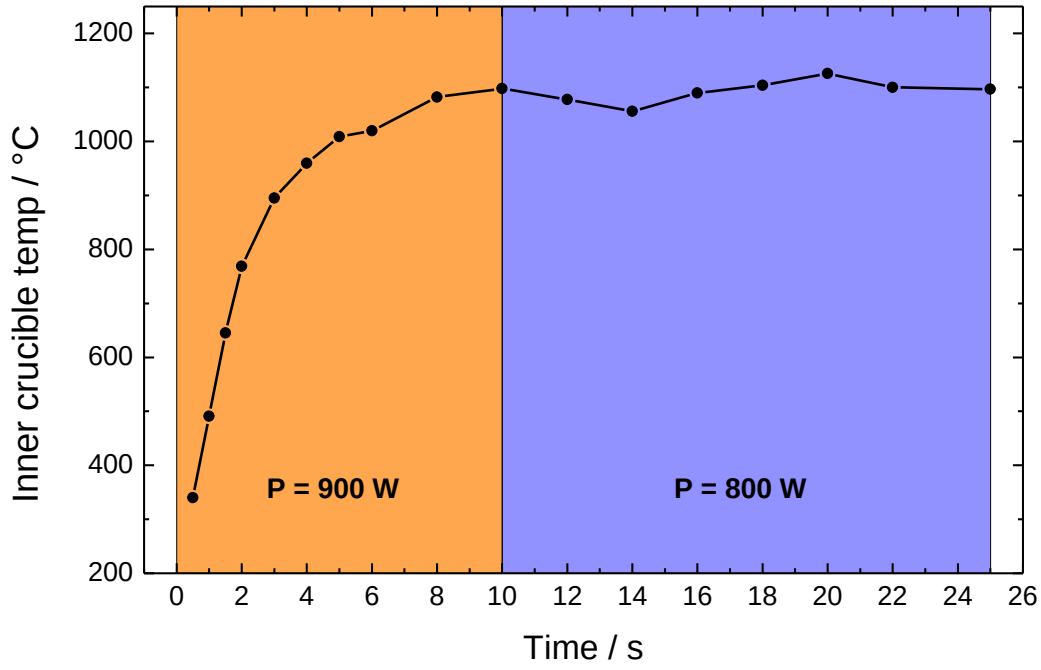

Figure S2. Correlation between the temperature of the sample crucible (surrounded by the activated charcoal) and the microwave exposition time. Each temperature point was measured with a Homis H811-451 hand pyrometer.

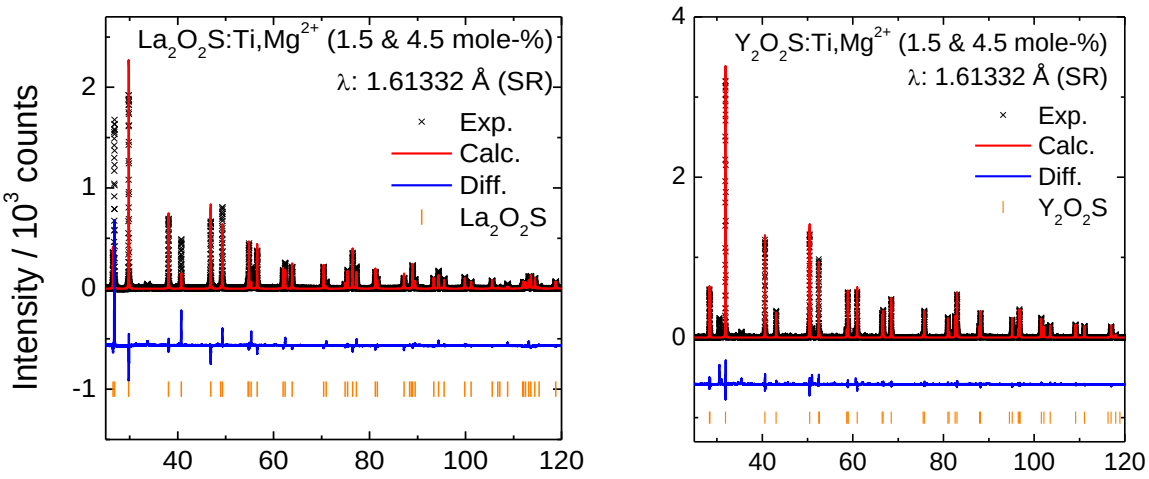

Figure S3. X-ray powder diffraction patterns of the $RE_2O_2S:Ti,Mg^{2+}$ [RE: La (left) and Y (right)] materials obtained with 25 minutes of microwave irradiation by microwave-assisted solid-state synthesis, with the Rietveld refinement results.

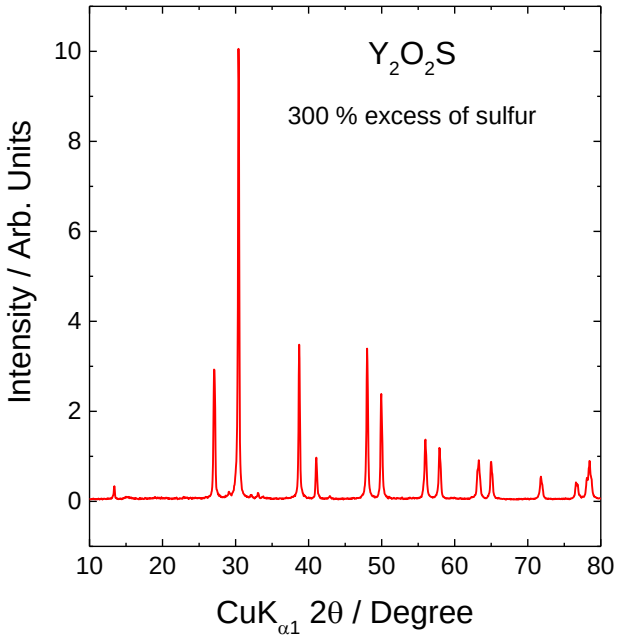

Figure S4. X ray powder diffraction pattern of the Y_2O_2S material obtained with 300% of excess of sulfur in the precursor, using the same pre adjusted microwave program.

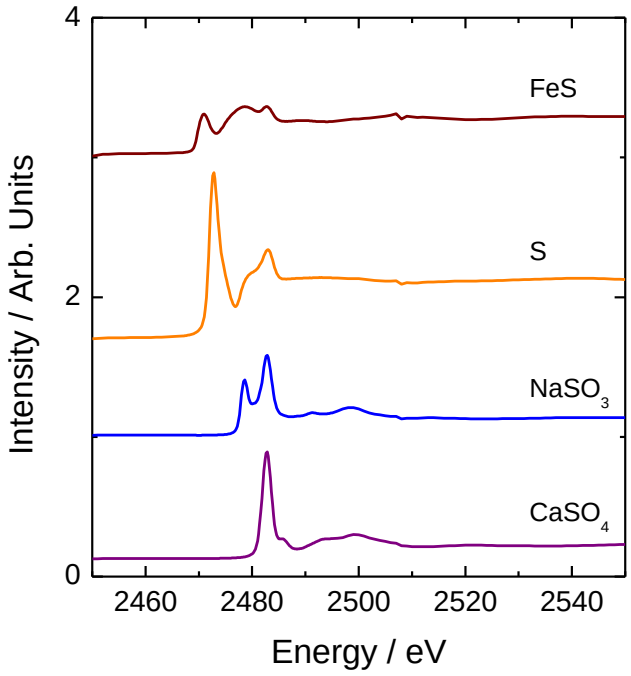

Figure S5. SR-XANES spectra at the sulfur K-edge of the standards materials for sulfur speciation.

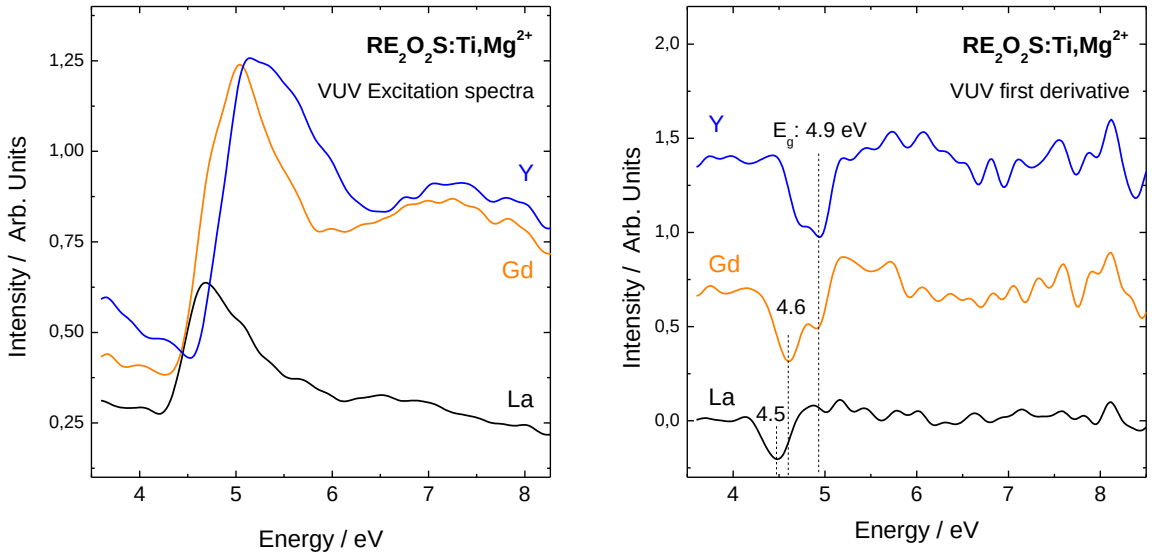

Figure S6. Synchrotron Radiation VUV-UV spectra (left) and derivative of the intensity (right) of the $RE_2O_2S:Ti,Mg^{2+}$ materials obtained by the microwave-assisted solid-state method.

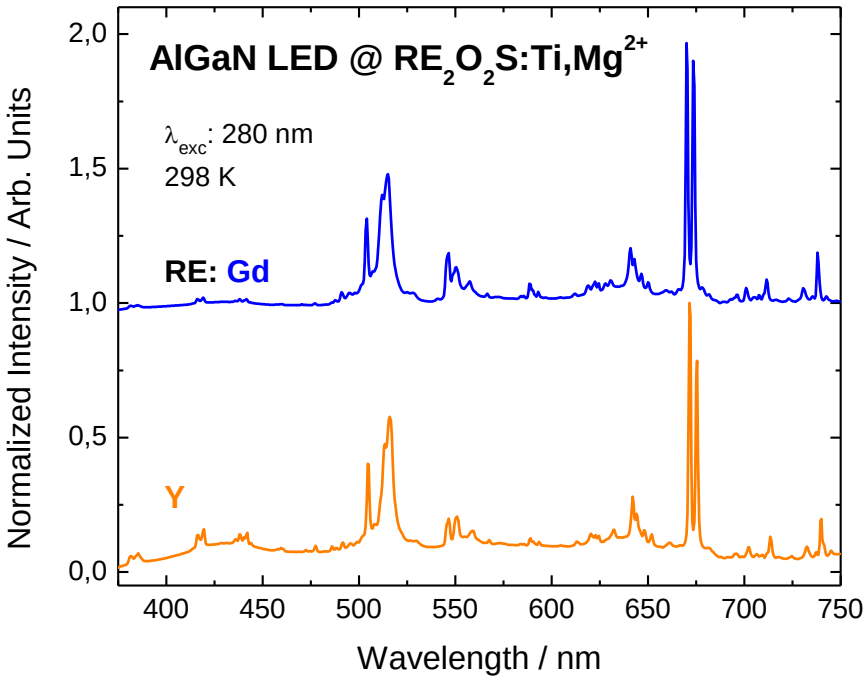

Figure S7. Photoluminescence emission spectra of the light emitting diodes devices fabricated from a AlGaN LED covered with a polydimethylsiloxane matrix doped with 10 %-wt of the $RE_2O_2S:Ti,Mg^{2+}$ (RE: Gd and Y) materials.