# Long persistent UV-A luminescence in $Sr_3MgSi_2O_8:Ce^{3+}$

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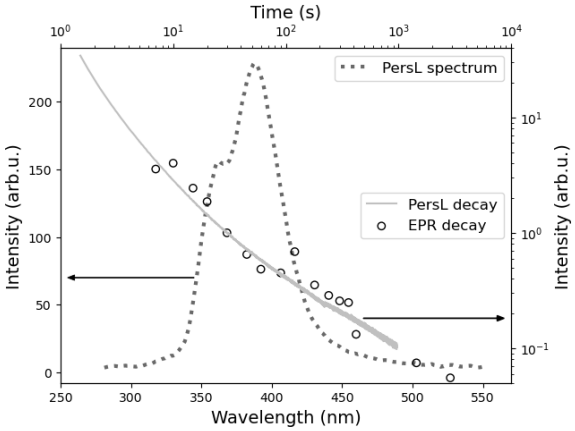
In recent years, there has been increasing interest in UV-emitting persistent phosphors. These materials have numerous potential applications such as photocatalysis, sterilization, and anti-counterfeiting. Herein, we report on the X-ray and UV-activated UV-A long PersL $Ce^{3+}$-doped $Sr_3MgSi_2O_8$ phosphor. Samples with different Ce concentration were prepared via high temperature solid state reaction method. Obtained materials were investigated using photoluminescence (PL), electron paramagnetic resonance (EPR), and thermally stimulated luminescence (TSL) spectroscopy methods. Our experiments demonstrate that the $Ce^{3+}$ PersL emission in the 300 - 450 nm range remains detectable for a minimum of 16 hours after X-ray or UV irradiation. The TSL analysis identified several discrete charge traps, exhibiting activation energies ranging from 0.5 to 1.7 eV. Subsequent EPR measurements confirm the existence of four paramagnetic centers. Investigation into the thermal stability of paramagnetic centers reveals that one of them ($g_1$ = 2.0056, $g_2$ = 1.9981, and $g_3$ = 1.9926) gradually decays at room temperature and is correlated with PersL processes [1].




PersL spectrum of $Sr_3MgSi_2O_8:Ce^{3+}$ and comparison of paramagnetic center signal time-derivative decay with PersL kinetics.

Latvian Council of Science, project “Defect engineering of novel UV-C persistent phosphor materials”, project No. LZP-2021/1-0118 is gratefully acknowledged.

[1] Doke G., Krieke G., Rodionovs P., Nilova D., Antuzevics A. Trap properties of novel UV-A persistent phosphor $Sr_3MgSi_2O_8:Ce^{3+}$ (2024) J RARE EARTH.

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