

## On the luminescence centers in $\text{SrAl}_2\text{O}_4:\text{Eu,Dy}$ and their role in the persistent luminescence process

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Persistent luminescent materials are ubiquitous in our daily life, from watch dials, toys and gadgets to pictograms for emergency exit signs [1]. However the mechanism behind this persistent luminescence is not yet fully understood. Strontium aluminates doped with europium and dysprosium ( $\text{SrAl}_2\text{O}_4:\text{Eu,Dy}$ ) is one of the most widely used persistent luminescent phosphor. It features a broad green emission band and bright long-lasting afterglow at room temperature [2]. Besides the green emission band a second, blue emission band becomes visible at low temperatures (< 220 K).

To our knowledge, the relation between the blue emission band and the persistent luminescence properties of  $\text{SrAl}_2\text{O}_4:\text{Eu,Dy}$  has not been studied in detail before. Therefore we present a dedicated study on this material in which we investigated the origin, temperature dependent behavior and influence on the persistent luminescence of both emission bands in this material. By combining temperature dependent charging and afterglow measurements with thermoluminescence measurements, we are able to gain further insight in the relation between the luminescence centers and/or traps in  $\text{SrAl}_2\text{O}_4:\text{Eu,Dy}$ . An energy level scheme will be presented.

Summarizing, we present a dedicated temperature dependent study on  $\text{SrAl}_2\text{O}_4:\text{Eu,Dy}$  which will enhance the understanding of the persistent luminescence mechanism in this phosphor.

[1] Van den Eeckhout, K.; Smet, P.F.; Poelman, D. "Persistent Luminescence in  $\text{Eu}^{2+}$ -Doped Compounds: A Review". *Materials* 2010, 3, 2536-2566.

[2] Matsuzawa, T.; Aoki, Y.; Takeuchi, N.; Murayama, Y. "A new long phosphorescent phosphor with high brightness,  $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+},\text{Dy}^{3+}$ ". *J. Electrochem. Soc.* 1996, 143, 2670-2673.