

# Effect of Eu<sup>3+</sup> + concentration on the photocatalytic activity of LaSr<sub>2</sub>AlO<sub>5</sub> powders

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Inorganic Chemistry Communications. Volume 59, September 2015, Pages 63–67

[doi:10.1016/j.inoche.2015.07.004](https://doi.org/10.1016/j.inoche.2015.07.004)

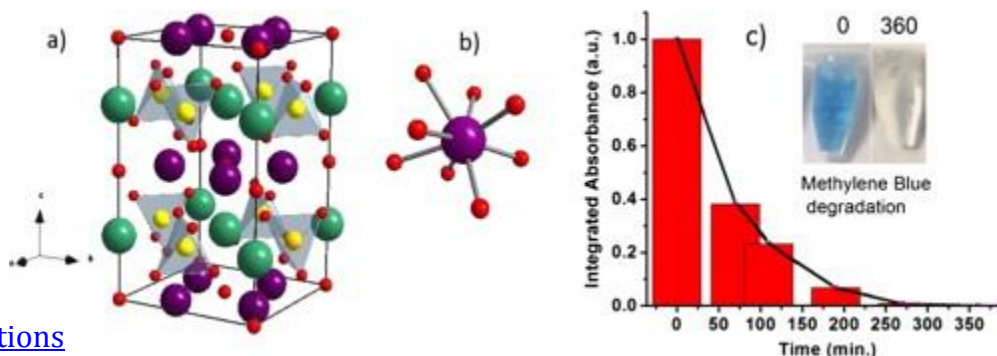
## Abstract

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The photocatalytic activity of LaSr<sub>2</sub>AlO<sub>5</sub>:Eu<sup>3+</sup> (LSA:Eu) ceramic powders was studied by monitoring the degradation of methylene blue (MB) dye in water under UV excitation (253 nm). Several LSA:Eu samples were fabricated with Eu<sup>3+</sup> concentrations from 1 to 10 at.%. XRD patterns show a single tetragonal phase for all LSA:Eu samples. Scanning electron micrographs of the ceramic powders depicted coalesced particles with average sizes in the range of 3.5–4.27 μm. The optical bandgap of these powders varies between 4.7 eV and 5.1 eV depending on the Eu<sup>3+</sup> concentration. The results of photocatalytic activity indicate that MB degradation rate increases as the Eu content increases. In fact, total MB degradation is reached after 360 min under UV light by using LSA:Eu (10 at.%) powders, and these can be removed easily after photocatalytic water treatment. Thus, LSA:Eu powders could be potential photocatalyst for water cleaning applications.

### Graphical abstract

a) Unit-cell schematic representation of LaSr<sub>2</sub>AlO<sub>5</sub>:Eu<sup>3+</sup>. The spheres represent the following atoms: La/Eu (purple), Sr (green), Al (yellow) and O (red). b) LaO<sub>8</sub> coordination formed by the La atom and the O atoms which is similar to the Eu and O atoms' coordination EuO<sub>8</sub>. c) Integrated absorbance bar graph of methylene blue solution catalyzed with LSA:Eu (10 at.%) photocatalyst powder as a function of time. The inset shows photographs of the solution with MB at the beginning (0 min) and at the end of the experiment (360 min).



[Figure options](#)