

# TL/OSL properties of CaSO<sub>4</sub>:Tm and CaSO<sub>4</sub>:Tm,Ag crystals

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Thermoluminescence (TL) is a useful technique to measure ionizing radiation. Nowadays, optically stimulated luminescence (OSL) technique has been also used in this type of monitoring, mostly because of no need of heating samples. Thus, the motivation of this work was to produce TL/OSL dosimeters based on crystals of CaSO<sub>4</sub> doped with thulium and silver, by means of a suitable new route. The crystals were produced by an adaptation of the slow evaporation route using calcium carbonate (CaCO<sub>3</sub>) as precursor, and incorporating the dopants (Tm<sub>2</sub>O<sub>3</sub>, and silver nanoparticles) in a solution of sulfuric acid, which is evaporated resulting in CaSO<sub>4</sub>:Tm or CaSO<sub>4</sub>:Tm,Ag crystal powder. X-ray diffraction analyses showed that produced samples exhibit only a single phase corresponding to the crystal structure of anhydrite. Radioluminescence confirmed the presence of Tm<sup>3+</sup> in the crystal matrix. TL/OSL characteristics such as glow curves, linearity, reproducibility, fading, kinetics order, and activation energy were evaluated. Samples doped with Tm and silver nanoparticles have shown the highest TL intensity and lowest fading, and were compared with commercial TLDs (TLD-100, TLD-900).

*Keywords:* Dosimetry, thermoluminescence, optically stimulated luminescence, CaSO<sub>4</sub>.

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