Contribution ID: **12** Type: **Invited Talk**

The luminescence of aluminate spinels: overview and application to dosimetry

Tuesday, November 5, 2024 3:35 PM (30 minutes)

Spinels present large compositional diversity and property tunability and thus are of interest to many technology fields. The cubic structure and broad optical transparency associated with a large band gap of the Mg and Zn aluminate spinels make these materials particularly attractive for optical applications.
MgAl2O4 and ZnAl2O4 in a diversity of forms, from powders prepared by the co-precipitation method and calcined at 900 C for 2 hrs. in air to natural crystals and artificial crystals grown by the Czochralski method, were investigated. Structural characterization was executed by X-ray diffraction and Raman spectroscopy. Radioluminescence (RL) under X-ray excitation from room temperature to 400 C was recorded. RL measurements revealed that both spinels presented a broad band peaked at ˜400 nm together with other bands attributed to Cr3+, Mn4+ and Mn2+ impurities. Thermoluminescence (TL) spectroscopy measurements up to 400 C were executed towards the identification of the recombination centers involved in the TL process, with the glow curves presenting several overlapping bands. TL spectroscopy measurements showed TL signal to be originated mostly from Cr3+ impurities. The stability of TL signal storage (fading) was also evaluated. Optically stimulated luminescence (OSL) was characterized as a function of the irradiation dose and in terms of its signal linearity with the irradiation dose and reproducibility. The minimum detectable dose (MDD) was determined, the OSL decay curves were analyzed in terms exponential functions, and fading was evaluated. A critical evaluation of MgAl2O4 as an OSL dosimeter is presented.

Type of presence

Presence online

Primary author: Prof. JACOBSOHN, Luiz (Clemson University)

Co-author: Ms CONNER, Robin (Clemson University)

Presenter: Prof. JACOBSOHN, Luiz (Clemson University)

Session Classification: Workshop on Sustainable Materials and Technologies

Track Classification: Workshop on Sustainable Materials and Technologies