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Microwave-assisted solid-phase synthesis of strontium aluminates doped with Yb^{2+}, Yb^{3+}

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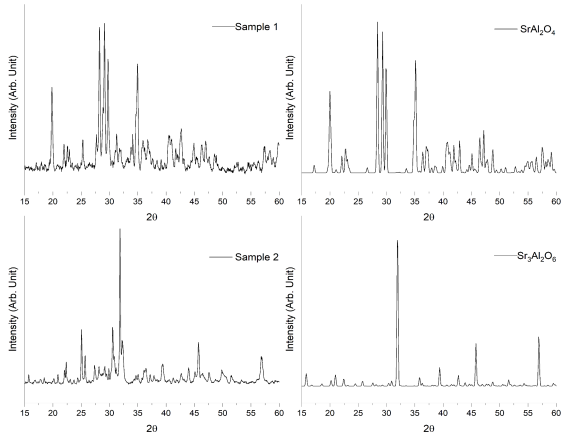
In recent decades, a wide range of materials with several matrices, mainly oxides, and dopants, rare earths or transition metals, that exhibit the phenomenon of persistent luminescence have been discovered. Among them, strontium aluminate matrices doped with rare earths have been the focus of various research studies, due to the excellent performance of materials such as $SrAl_2O_4$: Eu^{2+}, Dy^{3+} [1]; however, the traditional synthesis of these matrices is carried out using the solid-state method, which has disadvantages such as high energy consumption and long synthesis times. Due to these issues, alternative synthesis methods have been developed, such as the Microwave-Assisted Solid State (MASS) method which heats the precursor in a localized manner, making it more energy-efficient and reducing synthesis time compared to the ceramic method [2]. The objective of this work is to optimize synthesis using MASS and to characterize the phases $SrAl_2O_4$ and $Sr_3Al_2O_6$ doped with Yb^{2+} and co-doped with Yb^{3+}. Characterization of the obtained material will be performed to confirm the formation of the desired phases and the presence of dopants in the predicted sites, through the analysis of X-ray diffraction patterns (XRD), absorption and emission spectra, and possibly electron paramagnetic resonance (EPR) spectra. After the synthesis optimization new materials will be synthetized utilizing the lanthanide ions Eu^{2+} and Gd^{3+} for a better EPR characterization.



The XRD pattern of two samples already synthesized by MASS. The sample 1 matches with the structure of $SrAl_2O_4$ phase (ICSD Code#160296) and the sample 2 matches with the structure of $Sr_3Al_2O_6$ phase (ICSD Code#66062), despite having an additional peak at 2θ=25° attributed to impurities in the sample.

Acknowledgments:

References

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