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After-griding suppression of Persistent Luminescent SrS:Eu^{2+},Sm^{3+} material

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Efficient red persistent luminescence (PeL) materials are scarce, especially when compared to blue and green emitting phosphors and SrS:Eu^{2+},Sm^{3+} is a good candidate to fulfill this need. In this material Eu^{2+} in a strongly covalent environment exhibits intense red emission and Sm^{3+} is responsible for creating charge compensating defects responsible for storing charge carriers. These stored charges, with the aid of thermal energy, are responsible for the afterglow. However, we observed that intense grinding of this material causes a suppression in both duration and intensity of PeL effect. This work aims to comprehend the effects of grinding in the crystalline and defect structure. For this purpose, SrS:Eu^{2+},Sm^{3+} was prepared through microwave assisted solid state synthesis (MASS), using strontium sulfate, rare earth oxides and sulfur. Charcoal was used as the microwave susceptor and for generating in situ CO reducing atmosphere. The material was characterized by Raman spectroscopy, X-ray diffraction and photoluminescence spectroscopy prior and after grinding, indicating a strong quenching in the stored charge carriers. The results indicate that there is competition between the new defects created by grinding and those responsible for the persistent luminescence phenomenon.

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References

*[1] DOA Dos Santos et al., Dalton Transactions, **49**, 16386-16393 (2020).*