PROBING THE STRONTIUMTHIODISILICATE HOST WITH TRIVALENT CERIUM

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Abstract
Alkaline earth thiosilicates are interesting materials for luminescent applications. They can be doped with several rare earth ions, leading to visible light emission (1). Many different phases can be synthesized, often with several different crystallographic sites for the alkaline earth ion (2). Since doping elements such as Eu²⁺ and Ce³⁺ show an emission spectrum which is strongly dependent on the local environment, they can be used as probes for the alkaline earth site symmetry sites in thiosilicate hosts.

In strontiumthiodisilicate (SrSi$_2$S$_5$), in contrast to many other thiosilicates, there is only one site to be occupied by a luminescent ion, such as cerium or europium. As a result, we can use the excitation spectra of cerium in this host to extract information on the coordination and local symmetry of this site. Two different crystallographic models can be found in literature, one cubic model (Ribes (3) analogous to BaGe$_2$S$_5$) and one monoclinic model (Nakamura (4), space group C$_2$). Therefore, we compare both models and we investigate if both models are in accordance with the x-ray diffraction measurements and with the luminescence properties.

The typical spin-orbit split cerium emission of 465 nm and 515 nm is discussed.

References
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