

## **A new type of redshift - investigation of CsCaH<sub>x</sub>F<sub>3-x</sub>:Eu<sup>2+</sup>**

*Wednesday 21 June 2023 09:30 (15 minutes)*

The heteroanionic approach for the design of materials has led to variety of novel systems with unique properties. In particular, heteroanionic hydrides emerged with promising properties themselves. Over the recent years such compounds, in particular hydride fluorides have been thoroughly investigated as potential host materials for rare earth activated luminescence.

Here, the solid-solution CsCaH<sub>x</sub>F<sub>3-x</sub>:Eu<sup>2+</sup> is presented as the first calcium containing system of this kind. Investigations of the solid-solution's properties reveals unique optical behaviour: by increasing the hydride content within the series, a completely new type of redshift is observed upon excitation with UV-light. Instead of a single red-shifting emission band, new narrow emission bands emerge at the low energy regions. In total, the ratios of these emission bands determine the observable emission colour. Such a redshift mechanism has not been reported for any related system.

For the elucidation of this behaviour, a variety of analytical methods were applied. With the help of neutron diffraction data, obtained at the SPODI@MLZ, in combination with X-ray diffraction data, the crystal structures were fully solved. Further analytical techniques such as luminescence spectroscopy and vibrational spectroscopy then allow for the full understanding of this unique behaviour which will be explained in detail herein.

These findings will help for the design for new efficient phosphors, especially useful for red-emitting pc-LEDs.

**Primary author:** Dr MUTSCHKE, Alexander

**Presenter:** Dr MUTSCHKE, Alexander

**Session Classification:** Parallel 4