

PERSISTENT LUMINESCENCE OF CADMIUM SILICATES

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The most studied persistent luminescence phosphors contain Eu^{2+} as the emitting center [1,2]. In some systems, persistent luminescence is observed to originate from trivalent rare earths (R^{3+}), instead. $\text{CdSiO}_3:\text{R}^{3+}$ presents persistent luminescence arising from the R^{3+} ions (Tb^{3+} , Pr^{3+}), from defects (La^{3+} , Gd^{3+} , Lu^{3+}) or from both (Dy^{3+} , Sm^{3+}) [3]. Cd_2SiO_4 , however, does not show persistent luminescence when doped with *e.g.* Tb^{3+} . To understand this anomaly, the position of $\text{R}^{2+/3+}$ levels in the band gap was determined based on the synchrotron radiation (SR) VUV-UV-Vis spectroscopy yielding the band gap and charge transfer energies. For Tb^{3+} , the emitting excited levels are inside CB, and, thus, no persistent luminescence is observed. The position of Pr^{3+} levels suggests that $\text{Cd}_2\text{SiO}_4:\text{Pr}^{3+}$ material should show persistent luminescence, what is observed after ceasing the 300 nm irradiation. Finally, based also on structural data and other SR techniques as XANES/EXAFS, the mechanisms of the R^{3+} doped CdSiO_3 and Cd_2SiO_4 persistent luminescence were developed. A better understanding of the mechanisms may be achieved by simultaneous theoretical DFT studies.

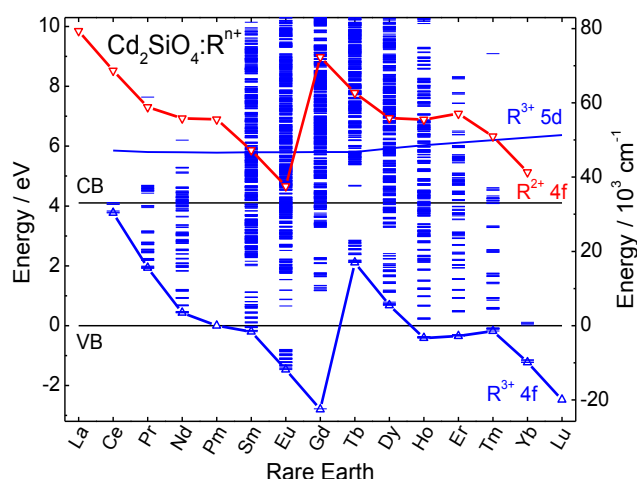


Fig. Location of the $4f^n$ ground and excited levels of $\text{R}^{2+/3+}$ in Cd_2SiO_4 .

References

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