

Luminescence quenching when going from Eu-doped alkaline earth thiosilicates to the isocationic thiogermanates

Europium-doped thiosilicate phosphors M_2SiS_4 , ($M = Ca, Sr, Ba$) are promising materials to be used in phosphor-converted LEDs. The efficiency of these phosphors could still be improved by increasing the thermal quenching temperature. This requires a deeper understanding of the position of the 5d and 4f levels of the Eu^{2+} -ion relative to the bandgap of this class of materials. In pursuit of this understanding, a study of the transition from the M_2SiS_4 to the isocationic M_2GeS_4 is performed. These materials are prepared by sintering a mixture of stoichiometric amounts of MS, Si, Ge in a flow of H_2S . Identification of the resulting materials is done using XRD. The structure of the thiogermanates is found to be very similar to the structure of the thiosilicates, but quite different in luminescent behavior. In contrast with the thiosilicates, the thiogermanates cannot generally be excited efficiently with UV light at room temperature. (In agreement with the results of Olivier-Fourcade, *Mat. Res. Bull.* Vol. 10, 975-982) Diffuse reflectance spectra of the thiosilicates and the thiogermanates are recorded and linked with the PL measurements.