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# Up-conversion and thermometric performance of CaF2:Tb3+, Yb3+ material

Temperature is an essential parameter in our lives. This spans from low-temperature environments of natural processes, such as biological systems, to high-temperature environments of manufacturing devices. Thermographic luminescence materials are an essential medium for remote temperature measurements. Luminescence materials thermometry utilizes temperature-sensitive powders, usually of host materials doped with small amounts of activator ions like rare-earth and/or transition metal ions. Thermographic phosphors exhibit a change in the luminescence emission intensity, a shift in the emission spectrum, or a decrease in the lifetime with temperature, from which the temperature can be obtained after calibration. The temperature quenching range, sensitivity, and precision of measurement are determined by the intrinsic characteristics of the phosphor materials, and they help discover and engineer new materials with enhanced temperature-dependent luminescence properties.
This work investigated the up-conversion and thermometric performance of CaF2:Tb3+, Yb3+ up-conversion material. The structural analysis was done using X-ray diffraction. X-ray photoelectron spectroscopy was used to identify the elemental composition of the material. The up-conversion of CaF2:Tb3+, Yb3+ material exhibited emission from both 5D4-7Fj and 5D4-7Fj bands. The luminescence intensity ratio (LIR) technique was employed, using 5D4-7Fj and 5D4-7Fj bands of CaF2:Tb3+, Yb3+ up-conversion for potential thermometric application. The temperature-dependent luminescence properties suggest that the material has the potential for thermometric applications.

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None

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