

Luminescence and Local Environment: Identification of Thermal History

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Abstract : Luminescence of transition metal and rare earth elements cover ultraviolet to far infrared wavelengths. Applications of phosphors are numerous. One can cite lighting, sensing, laser, energy, medical or military applications. But regarding each domain, specific criteria are required and they can be achieved with a strong control of the chemical composition. Emission of doped materials can be tailored with modifications of the local environment of the cations. For instance, the increase of the crystal field effect shifts the divalent manganese radiative transitions from the green to the red color. External factor as heat-treatment can induce changes of the doping element location or modify the unit cell crystalline symmetry. By controlling carefully the synthesis route, it is possible to initiate emission shift and to establish the thermal history of a compound. We propose to demonstrate through the luminescence of divalent manganese and trivalent rare earth doped oxide, that it is possible to follow the thermal history of a material. After optimization of the synthesis route, structural and optical properties are discussed. Finally, thermal calibration graphs are successfully established on these doped compounds. This makes these materials promising probe for thermal sensing.

Keywords : emission, thermal sensing, transition metal, rare earth element

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