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How to highlight the history of a material through the registration of luminescence properties

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Considerable efforts have been carried out to develop new tools and research efforts in the domain of functionalized materials (information, lighting, communication, energy, etc.). As an illustration, to correlate the optical response of a material to another of its property is possible through the monitoring of the luminescence. Modifications of the doping element local environment are associated to crystal field strength modification. For instance, divalent manganese radiative transitions can be observed from the green to the red ranges. Synthesis control route makes possible a red to green luminescence switch of manganese doped spinel treated at high temperature in relation with the cation migration through the host lattice. In other matrices, external factors induce unit cell symmetry transition. This effect can also be observed in rare earth doped compounds as Eu^{3+} doped sesquioxide. Irradiation energy is also an efficiency factor which can initiate redox processes. The oxidation of europium +II to europium +III state results in a shift from blue to red emission and the UV irradiation of cerium doped indium elpasolite matrix leads to the decrease of the doping element emission in favor of a bright orange emission. The corresponding redox process is reversible under adequate irradiation or heat treatment temperature. Such local modification can easily be detected over the visible range. Emission of ZnO is strongly related to synthetic routes. Low operating temperature can result in the appearing of surface and bulk defects. Their existence impacts not only the emission wavelength but also its stability under specific atmosphere. Finally, luminescence spectroscopy is not only a technique to register the spectral distribution of the excitation or emission radiative de-excitation, it is also an efficient tool to highlight the influence of external factors and to record the history of a materials.

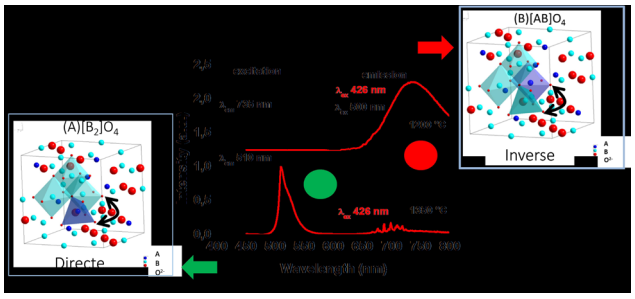

Figure 1: Tailoring of Mn^{2+} doped $ZnAl_2O_4$ luminescence with temperature.

Biography

Véronique Jubera is an Associate Professor-HDR, University of Bordeaux. She has over 70 publications in international journals. She is a specialist of luminescence in inorganic doped compounds. She has been working as an Associate Professor at the ICMCB-CNRS, University of Bordeaux since 14 years. Her research topic deals with the structure-luminescence properties of crystallized materials.

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