Poster Presentation

MS106.P19

Ce^{3+} sensitized Ln^{3+}-doped nanocrystals for sensing and light emitting applications

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The scientific quest towards lanthanide (Ln3+)-doped nanomaterials is continuously growing which is largely attributed to the unique optical properties resulting from their inner 4f electrons. The intra 4f-4f transitions from Ln3+ ions span a wide optical window (say from UV to near infrared). In addition to the generally observed Stokes emission, they exhibit interesting anti-Stokes emission known as upconversion process, where one or more low energy photons combined to produce high energy light. However, the Ln3+-doped nanocrystals suffer from low quantum efficiency due to forbidden nature of the intra 4f transitions. Our objective of the increase the luminescence quantum efficiency of Ln3+ ions via energy transfer. Both Ce3+ and Yb3+ are good sensitizers for enhancing the luminescence via Stokes and upconversion process, respectively. This talk will cover discussion on Ce3+/Ln3+ (Ln = Tm, Tb and Sm)-doped nanocrystals for developing blue and white light emitting materials and their use in the fabrication of transparent nanocomposites by incorporating them in polymer matrix. The energy transfer mechanism between Ce3+ and some of the Ln3+ ions which led to the production of white light emission is shown in the below image. In addition, the talk covers the use of Ce3+/Tb3+-doped SrF2 nanocrystals for the detection of Cu2+ ions at the nanomolar concentration. Finally, the talk will cover how the Ce3+ to Ln3+ energy transfer can be tuned via phase change by taking NaYF4 as host for the lanthanide ions. In fact, the study provides new insight that the energy transfer efficiency between Ce3+ and Ln3+ ions is higher in cubic phase NaYF4 nanocrystals compared to hexagonal phase nanocrystals due to difference in crystal field splitting of the 4f5d level of Ce3+ ions.

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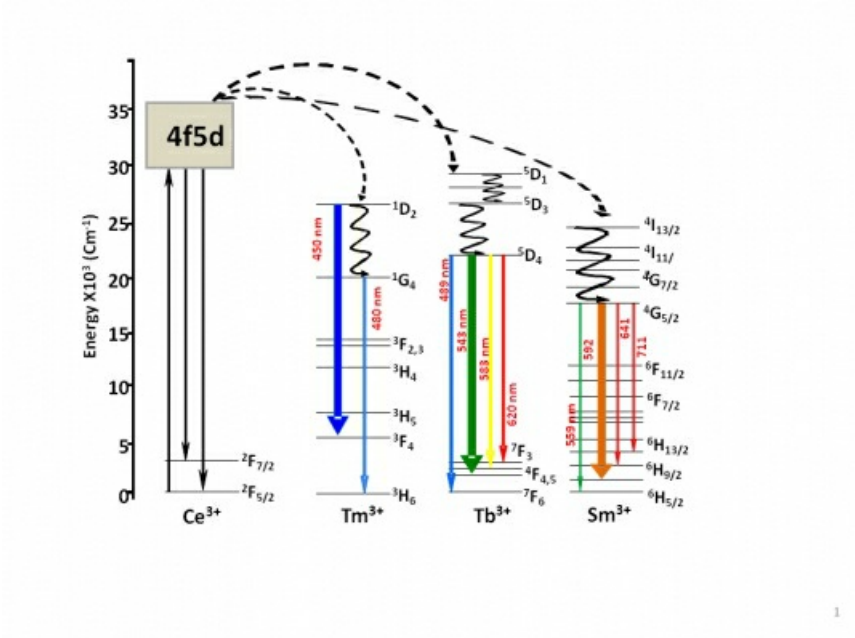

Keywords: lanthanides, luminescence, white light