Title: Rare earth ion activated GdPO4 and related phosphor materials and their photoluminescence properties

Abstract: From past few decades, rare earth ions activated gadolinium orthophosphate (GdPO4) phosphors generated great attention as multimodal agents mainly for optoelectronic and biomedical applications. Due to their excellent ability of hosting activator and sensitizer ions in their lattice, higher quantum yields, lower photo-bleaching potential, high chemical and thermal stability, importantly low toxicity and bio-compatibility nature. On doping with suitable rare earth ions, the GdPO4 host lattice turned to be a bi-functional magnetic and luminescent material. Compared to other lanthanide ions, Eu3+ ion is the most attractive and an extensively used luminescent activator ion due to its broad excitation band, excellent red emission and high thermal stability. Eu3+ activated GdPO4 crystallizes in the hexagonal structure at low temperature and monoclinic structure at high temperature. Among these phases, monoclinic phase is plying important role in the energy transfer between Gd3+ and Eu3+ in GdPO4 phosphor and it was clear that, the monoclinic phase exhibits an enhanced luminescent properties as compared to the hexagonal structure. Further, luminescence efficiency can be amplified by modifying the phosphor compositions by co-doping with suitable sensitizer ions. Such as, monovalent alkali metal ions (Li+, Na+ and K+) are widely used as sensitizers due to their ionic radius and ionic charges which are different from those of the host (Gd3+) ion,

the distortion of crystal lattice is introduced as well as a break of the local site symmetry which can lead to a better color purity for optoelectronic and enhanced luminescent intensity for LEDs applications. In this presentation, I will discuss the synthesis, structure and luminescent properties of Eu3+/Sm3+ doped GdPO4 and LaPO4 phosphors, further effects on luminescent properties on co-doped with monovalent, divalent and trivalent ions as a sensitizer's in the doped GdPO4 matrix.