

One page proposal for Doctoral work

Title: Perovskite structured activated phosphors for LED applications

Purpose of the proposal:

Long phosphorescent phosphors/long persistent phosphors (LPPs) continuously stimulate the extensive research interest of materials scientists, chemists, physicists, and even biologists because of their mysterious optical phenomenon and the widespread applications. Especially, after recent decades of development, the applications of LPPs have spread from the initial civil uses, i.e. decoration, safety displays, dials, etc., to a wide range of advanced scientific application fields, such as life sciences, biomedicine, clinical medicine, energy and environmental engineering. The corresponding overwhelming contributions have been made to the development of near-infrared (NIR) LPPs or nano-scale LPPs, with the advent of new material systems, design methodology, and synthesis and functionalization routes. Furthermore, physicists have proposed many theoretical and experimental models to understand the trapping–detrapping process along with the capture, migration and release kinetics of charge carriers. Up to now, the related research has made great progress, thus we think it is the right time to do the research work to further stimulate the motivation of developing novel LPPs and open up new applications of LPPs.

Materials selected:

As aim the research work, we propose the following materials to do research work on LPPs.

- ❖ **CaTiO₃: Pr³⁺**
- ❖ **SrZrO₃: Pr³⁺**
- ❖ **NaNbO₃: Pr³⁺**
- ❖ **BaZrO₃: Mg²⁺**
- ❖ **CdGeO₃: Pr³⁺**
- ❖ **MgGeO₃: Mn²⁺, Bi³⁺**
- ❖ **MgSiO₃: Eu²⁺**

Methodology:

- Preparation of the materials (Yet to be search for the preparation technique)
- Powder X-ray diffraction studies for the structural analysis
- Elemental compositional and morphological analysis for the knowing species present in the materials and size of the materials respectively.
- Photo luminescent spectra
- X-ray photoelectron spectra if possible
- Life time measurement and quantum efficiency