

CHALLENGES AND OPPORTUNITIES IN NANOPHOTONICS

Elder De la Rosa

Grupo de Nanofotónica y Materiales Avanzados
Centro de Investigaciones en Óptica
A.P. 1-948, León Gto. 37150 Mexico
elder@cio.mx

Research in Material Science is a continues process that has been the trigger for emerging fields as is the case of Nanoscience and Nanotechnology. This multidisciplinary field is focused to the design, study and application of nanomaterials properties in different areas. The Nanostructured materials exhibit physical properties different from bulk counterparts that are very attractive for photonics applications. This is the case of quantum dots (QDs) where the visible emission is produced by the recombination of excitons being tuned with the crystallite size as a result of the quantum confinement. The visible emission from oxide nanocrystals (ONCs) is produced by the presence of defects or rare earth ions via down and up conversion process. In this case, there is not quantum confinement effect but the excitation dynamic of active ions is influenced by the nanoscopic interaction that can induce an enhancement or quenching of the fluorescence emission. In fact, not only size but also defects on the bulk and surface of nanocrystals (NCs) play an important role to define the electronic properties including luminescence and electron transport for optoelectronic and photonic devices. In any case, the understanding of the physical mechanism provide great challenges for fundamental research and applications. Here in this talk, we will discuss recent results on the luminescent and electronic properties of NCs and applications on solid-state lighting, solar cells, biolabeling and molecular detection.