Editorial

Luminescence in Nanomaterails

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The advent of nanostructures has revolutionized the world, with radical breakthroughs in areas such as materials and manufacturing, electronics and instrumentation, medicine and health care, energy and environment, chemical and pharmaceutical, biotechnology and agriculture etc. Nanotechnology is the coming revolution in molecular engineering and therefore it is curiosity-driven and promising area of technology. The field of nanoscinece and nanotechnology is interdisciplinary in nature. It is being perused by physicists, chemists, material scientists, biologist, engineers, computer scientists etc. not only because of its fascinating nature but also because of overwhelming and novel applications in almost all branches.

Importance of nanotechnology is growing day by day. So far, most applications involve enhancement of pre-existing materials, but new developments are expected. It shows great promise for providing us in near future with many breakthroughs that will change the direction of technological advances in a vide range of applications. The use of nanostructured materials has produced transistors with record low speed and lasers with low threshold current. These are being used in compact disk player systems, low noise amplifications in satellite receivers as sources for fibre optic communication etc. Constructive applications of naomaterials include self cleaning glass, UV resistant wood coating etc. Nanoscale devices are being used in medical field also for diagnosis, treatment and prevention of diseases and in drug delivery system, magnetic resonance imaging, radioactive tracers etc. Lighter and more fuel efficient cars, iron particles for immobilizing pollutants, liquid slurry paint for collecting solar energy, mirrors that don't fog, gene chips and fat soluble vitamins in aqueous beverages are some of the first manifestations of nanotechnology. Many more applications may be possible with the novel and peculiar properties of nanostructures.

The fact, which makes the nanosctructures interesting, is that the properties become size dependent in nanometer range because of surface effect and quantum confinement effect. The geometrical structure, chemical bonds, ionisation potential, electronic properties, optical properties, mechanical strength, thermal properties, magnetic properties etc. all are affected by particle size in this range. Unique and tailorable optical properties like absorption, spectral response, photoluminescence, electroluminescence, Raman scattering etc. have been observed in some semiconductor nanostructures. Nanophase materials have potential as efficient phosphor in display applications such as new flat panel displays with low energy excitation source, solar energy converts and optical amplifiers. Recent reports suggest that nanoparticle can be used to produce light of various colours by band gap tuning. The emission colour can be tailored by changing the crystalline size and appropriate doping. In case of nanoparticles the enhanced surface to volume ratio and modified density of sates take part in efficient luminescence processes. In addition to that, nanosized fluorescent materials are more stable with high luminescence intensity, low photo-bleaching and large Stoke's shift. Nasnophosphors may find wide applications in lamp technology, display technology, solid state lighting, nanoelectronics, spintronics, quantum computing, nanomagnetics nano-photonics, ultra fast memory, high speed sensors and many more.

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