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Non-cadmium quantum dot based hybrid structures for display applications

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Display technology has become a ubiquitous part of our everyday lives. The evolution of this technology spans nearly a century and continues to drive new innovations. From the warbled picture on a 1950s television to the early Macintosh computers to today's impressive AMOLED and flexible screens, display technology is a fascinating exploration in human innovation. The advent of organic light emitting display (OLED) where the subpixels themselves emit red, green, and blue light was a major breakthrough providing deep black levels, wide viewing angles, and, with some types of emissive technologies, faster switching times. This technology has eclipsed the cathode ray tube, liquid crystal display and plasma display technology entirely. However, OLED technology has some lingering challenges, mainly in cost, power consumption, and longevity. Researches in quantum dot light-emitting devices (QLEDs) have been attracting much attention in the recent few years as a promising candidate for high-efficiency and color-saturated displays. The QLED can be engineered to emit light in any desired emission band in the Ultra Violet - visible- Infra Red region. A major bottleneck in the commercial viability of QLEDs for display applications is their reliance on the highly toxic and environmentally restricted Cd. As a result, efforts are now beginning to shift towards Cd-free device structures. This talk will present an overview of the development in non-cadmium based QLEDs. We will also present a novel design and fabrication methodology for Cd free, hybrid, bright white Light-emitting diodes using conducting polymers and semiconducting nanoparticles. The devices utilize multilayers of self-organized nanoparticles and polymers stacked in a vertically aligned superstrate configuration on a transparent conducting glass using spin coating technique. The I-V characteristics revealed a rectifying behavior with low turn on voltage and a broad band white light emission which unambiguously demonstrated their candidature for futuristic solid-state lighting and applications in ultrathin flexible display devices.

Biography

Neha Tiwari is an Assistant Professor in Electronics & Communication Engineering Department in NU. She did her PhD in Nanoelectronics and MTech in Digital Communications from Barkatullah University, Bhopal. Before joining NU, she served as Assistant Professor in University Institute of Technology, Barkatullah University, Bhopal for 10 years.

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