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Dual-function optoelectronic devices fabricated using ZnO quantum dots and polymer composites

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Abstract

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Optoelectronic devices with dual-function consisting of LEDs and OBDs, both containing ZnO QDs dispersed in a hybrid poly N-vinylcarbazole (PVK) and polymethylmethacrylate (PMMA) polymer layer, were fabricated on indium-tin-oxide (ITO)-coated glass substrates using a simple spin-coating technique. Transmission electron microscopy images showed that the ZnO QDs were distributed around the PVK and the PMMA. The laminated devices showed the electroluminescence of LEDs and the electrical bistabilities of OBDs. To make the OBDs into the LEDs, a PEDOT:PSS hole injection layer and a PVK hole transport layer were inserted between the active layers and the electrodes, respectively. Luminescence mechanisms of the LEDs and operating mechanisms of the OBDs are described on the basis of the experimental results.

Keywords: ZnO, quantum dots, LED, OBD, polymer, Optoelectronic device

1. Introduction.

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