

Tunable electroluminescence from low-threshold voltage LED structure based on electrodeposited $Zn_{1-x}Cd_xO$ -nanorods/p-GaN heterojunction

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Abstract

Abstract Violet light-emitting diode (LED) structures based on Cd-alloyed zinc oxide ($Zn_{1-x}Cd_xO$) nanorods (NRs)/p-GaN heterojunction have been fabricated by epitaxial electrodeposition at low temperatures in an aqueous soft bath followed by a mild thermal annealing. The ultraviolet (UV) room-temperature emission peak at around 397 nm with a full width at half-maximum (FWHM) of 10 nm observed from pure ZnO-NRs/p-GaN at room temperature was shifted to 417 nm with FWHM of 14 nm by employing a $Zn_{0.92}Cd_{0.08}O$ -NRs/p-GaN heterojunction. The emission threshold voltage was low at about 5.0 V and the electroluminescence (EL) intensity rapidly increased with the applied forward-bias voltage. The emission wavelength increased with the Cd content in the alloy. The EL physics mechanism in LED structures of the heterojunctions is discussed.