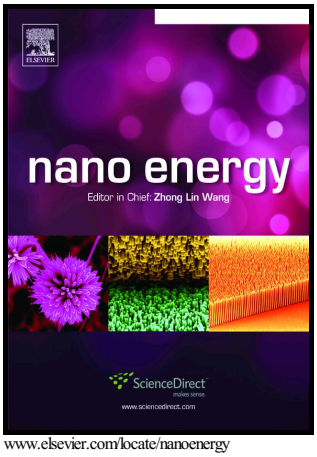

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Piezoelectric effect on compensation of the quantum-confined Stark effect in InGaN/GaN multiple quantum wells based green light-emitting diodes

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Abstract

InGaN based light emitting diodes (LEDs) suffer from the adverse influence of band tilt due to the piezoelectric field induced quantum-confined Stark effect (QCSE). We demonstrate incremental recovering of QCSE induced band tilt along with its impact on the performance of III-nitride-based green LEDs (at 532.5 nm) by applying external stress. The external tensile stress determined by peak shift in Raman spectroscopy ranges from 0 to 0.95 GPa as the wafer curvature increases from 0 to 2.32 m^{-1}. Compared to the pristine LEDs wafer, the PL emission peak undergoes an increase in intensity of 61%, blue shift of 11.5 nm and peak narrowing of 5.5 nm through bending the wafer to the maximum curvature of 2.94 m^{-1}. These results all