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Correlation between optical properties and strain relaxation in thick InGaN epitaxial films.[1] WEN-CHE TSAI[2], Chung Yuan Christian University in Taiwan, CHIA-HE HSU, SHAO-FU FU, FANG-WEI LEE, CHIN-YU CHEN, WU-CHING CHOU, WEI-KUO CHEN, WEN-HAO CHANG[3], Department of Electrophysics, National Chiao Tung University — The alloy compositions, strain distributions and emission properties of thick $In_xGa_{1-x}N$ layers with x ranging from 0.13 to 0.38 are investigated. High resolution x-ray diffractions (XRD) and reciprocal space mapping (RSM) along an asymmetric axis reveal that the In composition inhomogeneity is accompanied by strain relaxations during the growth of thick InGaN layers. Photoluminescence (PL) results together with RSMs indicate that the observed double PL peaks are associated with the strained and relaxed phase in the InGaN films. It is further indicated that the relaxed phase in InGaN films exhibits better emission efficiency than the strained phase from the temperature-dependent PL measurements. Recombination dynamics from time-resolved PL measurements reveal that the carrier localization effect is more pronounced in the relaxed phase. According to the optical properties, the emission efficiency is strongly correlated with the localization effect in thick InGaN films.

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