Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

The carrier recombination of InGaN/GaN MQW LED CHING-LIANG LIN, SHAN-FU WANG, ZHI-XUAN CHEN, DER-JUN JANG, Department of Physics, National Sun Yat-sen University, MENG-EN LEE, Department of Physics, National Kaohsiung Normal University — The radiative and nonradiative recombination of InGaN/GaN multi-quantum well light emitting diode was studied by a time-correlated single-photon counting apparatus with temporal resolution of 150 ps using laser pulses of energy 4.5 eV from a Ti:sapphire laser. The energy of the PL peak intensity was found to be blue-shift below 100 K and become red-shift with increasing temperature. Activation energies of 11 and 109 meV were found by fitting the temperature dependent PL intensity with the Arrhenius equation. These two activation energies are associated the hole and electron delocalization. The recombination lifetime was found to decrease with photon energy. The radiative recombination lifetime was found to be constant below 100 K and this observation is related to the S-shape behavior in temperature dependent PL spectrum, which is attributed to the formation of triangular potentials at the valence and conduction bands. The radiative lifetime, after 100 K, increases with temperature by $T.^{3/2}$ The nonradiative recombination is insignificant at low temperature and is dominated at temperature above 200 K.

Zhi-Xuan Chen
Department of Physics, National Sun Yat-sen University

Date submitted: 09 Nov 2012 Electronic form version 1.4