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Hot carrier cooling in Si-doped InN JHENG-YU WU, CHIA-SHIA WANG, ANTARYAMI MOHANTA, MING-SUNG WANG, DER-JUN JANG, LI-WEI TU, Department of Physics, Natl Sun Yat Sen Univ — Temperature and excitation power dependent time-integrated photoluminescence of Si doped InN thin films are investigated. Photoluminescence (PL) spectra at low temperatures are described by single emission peak ensued due to ?free-to-bound? recombination; whereas PL spectra at higher temperatures above 150K are characterized by both ?band-to-band? and ?free-to-bound? transition. Carrier dynamics of Si doped InN thin films is studied using pump-probe reflection spectroscopy at room temperature. The hot electron cooling process is well described by electron-electron scattering. The dependence of the hot electron cooling rate on total electron density shows sublinear to linear behavior with increase of background electron density. The variation of the carrier recombination lifetime with total electron density implicates the dominance of the defect-related nonradiative recombination channel over other recombination processes.

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