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Nonradiative recombination in InN thin films JIAN-YU CHEN, DER-JUN JANG, SHAHAM QUADIR, LI-WEI TU, Natl Sun Yat Sen Univ —
InN thin films grown by molecular beam epitaxy were investigated by time-resolved photoluminescence (TRPL) upconversion apparatus. The samples were illuminated by laser pulses from a Ti:sapphire laser with the energy of 1.5 eV and the pulsewidth of 100 fs. The intensity of the TRPL decays rapidly as the temperature and pumping inentensity increase. The radiative and nonradiative decay rates as a function of carrier density were derived from the TRPL signals at various temperatures. The Shockley-Read-Hall, radiative recombination, and Auger recombination coefficients were obtained by fitting the derived decay rates with the rate equation. The radiative decay times determined from the rate equation is comparable to theoretical prediction. The SRH coefficient is proportional to the background carrier density. In all samples, we found the Auger rates increase with the temperature and carrier density. The phonon-assisted Auger recombination was found to be the dominant process in the nonradiative recombination.

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