Femtosecond time-resolved photoreflectance of InN thin films.\textsuperscript{1}
TSONG-RU TSAI, CHIH-FU CHANG, Institute of Optoelectronic Sciences, National Taiwan Ocean University, Keelung 202, Taiwan, Republic of China, S.-F. GWO, Department of Physics, National Tsing-Hua University, Hsinchu 300, Taiwan, Republic of China — The kinetics of the nonequilibrium photoexcited carriers in high-quality InN is investigated using femtosecond time-resolved pump-probe reflectivity measurements at room temperature. We observed that both of the hot-carriers relaxation times and carrier recombination times decrease with increasing photoexcited carrier density. We attribute the hot-carriers relaxation times anomaly is caused by the impact-ionization effect. And the carrier density-dependent recombination times can be explained by the Auger recombination (AR). The AR rate was found to have a quadratic rather than a cubic dependence on carrier density. The experimental results allowed the coefficients for impact-ionization, AR and a defect capture time in InN to be estimated as $2.3\times10^{-9}\text{cm}^3/\text{s}$, $2.5\times10^{-10}\text{cm}^3/\text{s}$ and 535 ps, respectively.

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