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Terahertz radiation mechanism of native n-Type InN with different carrier concentrations KUANG-I LIN, JUNG-TSE TSAI, JENN-SHYONG HWANG, Department of Physics, National Cheng Kung University, HON-WAY LIN, SHANGJR GWO, Department of Physics, National Tsing Hua University, MENG-CHU CHEN, Institute of Nuclear Energy Research — InN has received considerable attention due to its lower effective mass, higher mobility, and higher velocity saturation compared with GaN or AlN. The fundamental band gap of InN has recently been reevaluated to be around 0.6–0.7 eV, being therefore a promising candidate for terahertz (THz) applications. In this study, the polarity and mechanism of THz radiation from native n-type InN excited by femtosecond optical pulses are investigated. The optical properties, electron concentrations, and crystalline quality are characterized by photoluminescence and Raman scattering spectra. The electron concentrations are estimated to be between 0.35×10^{19} and 3.87×10^{19} cm^{-3}. The intensity ratio of the A_1(LO) to E_2(high) mode increases with increasing electron concentration. The polarity of THz radiation field from the samples with higher electron concentrations is opposite to that from p-InAs, indicating that the dominant radiation mechanism is the drift current. However, the samples with lower electron concentrations show the same polarity as p-InAs. Under this condition, the radiation mechanism is dominated by the photo-Dember effect.

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