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Ultrafast Raman Studies of Electron Transient Transport in InN Thick Film Grown on GaN KONG-THON TSEN, D.K. FERRY, Arizona State University, HAI LU, WILLIAM J. SCHAFF, Cornell University — GaN, AlN, InN and their alloys have long been considered as very promising materials for device applications. Semiconductor alloys such as $In_xGa_{1-x}N$ have been successfully used in the fabrication of blue-green light emitting diodes and laser diodes. Recently, growth of high quality InN as well as $In_xGa_{1-x}N$ have been demonstrated. In Particular, progress in the manufacturing of very high quality, single-crystal InN thin films has opened up a new challenging research avenue in the III-nitride semiconductors. InN together with its alloys of GaN and AlN enable the operation of light emitting diodes and diode lasers ranging in spectral wavelength from infrared all the way down to deep ultraviolet. It has also been predicted that InN has the lowest electron effective mass among all the III-nitride semiconductors. As a result, very high electron mobility and very large saturation velocity are expected. In this paper, we report experimental results of electron transient transport on InN thick film grown on GaN. Electron drift velocity as large as $7.5x10^7 cm/\sec$ has been found when the sample is excited by an ultrafast laser pulse with pulse width about 600 femtoseconds. Our findings demonstrate that InN has great potential for use in the ultrafast electronic devices.

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