

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Intervalley Transitions in GaN Single Crystals S. WU, D. WANG, R. SOBOLEWSKI, University of Rochester, Rochester, NY 14627, P. GEISER, J. JUN, J. KARPINSKI, ETH, CH-8093 Zurich, Switzerland — We present the direct observation of the intervalley transition of electrons between the conduction band Γ valley and the L valley in GaN single crystals, using the two-color (ultraviolet-near infrared), femtosecond, pump-probe spectroscopy technique. We have found that scattering of electrons from the Γ to L valley is faster than the optical phonon emission time, while the return process of electrons from L to Γ is measurably slower. The developed model based on three-state rate equations fitted very well our experimental results. The fitting parameters showed that the Γ -L scattering time is ~ 250 fs, while the L- Γ return time is ~ 1 ps. The optical phonon emission time was found to be equal to ~ 500 fs. The characteristic scattering times obtained in our experiments demonstrate that the dynamics of the intervalley transition process in GaN is substantially slower than the similar transitions earlier observed for GaAs.

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Date submitted: 03 Dec 2005

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