Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Theory of carrier dynamics and coherent phonons in piezoelectric semiconductor heterostructures[1] GARY SANDERS, CHRIS STANTON, University of Florida — We model generation and propagation of coherent acoustic phonons in time resolved reflectivity experiments on InGaN/GaN multi quantum wells embedded in a pin diode structure. Carriers are created in the InGaN wells by ultrafast pumping below the GaN band gap. The electronic states in the multiquantum well structure are obtained in an effective mass model and the generation and subsequent relaxation of photogenerated carriers in the well are treated in a Boltzmann equation formalism. Coherent acoustic phonons are generated in the quantum well via a strong piezoelectric electron-phonon interaction with photogenerated carriers. These propagate into the structure at the LA sound speed modifying the optical properties and giving rise to an oscillatory differential reflectivity signal. We also study the THz radiation emitted by the photoexcited carriers and phonons. In addition to studying the multiquantum well structure, we also study chirped superlattices were the well widths increase with distance and investigate the possibility of selectively exciting carriers in a given well to coherently control the response.

[1]Supported by NSF DMR-0325474

Gary Sanders
University of Florida

Date submitted: 29 Nov 2005 Electronic form version 1.4