Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

**An excitonic state-resolved approach to coherent phonons in quantum dots: generation and relaxation dynamics.** RYAN COONEY, D.M. SAGAR, SAMUEL SEWALL, PATANJALI KAMBHAMPATI, McGill University — The strength of exciton-phonon couplings in quantum dots has remained controversial due in part to the complex eigenstate spectrum of electrons and holes in these systems. We recently implemented a combined time/frequency domain approach, towards exciton selective spectroscopy. This approach initially yielded a unified picture of the controversial mechanism of electron and hole relaxation dynamics in quantum dots. Recently, this approach yielded the first simultaneous observation of underdamped coherent optical and acoustic modes, thereby providing a direct measure of the controversial size dependent exciton-phonon coupling strengths for both modes. Pumping into higher excited states reveals that the Auger based electron relaxation process is vibrationally incoherent whereas non-adiabatic hole dynamics retain a memory of the vibrational coherence. Finally, phase and state-selective results reveal the electronic surface upon which the vibrational coherence is generated.

Patanjali Kambhampati
McGill University

Date submitted: 02 Nov 2007 Electronic form version 1.4