Abstract Submitted
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Theory of carrier dynamics and coherent phonons in ferromagnetic semiconductor heterostructures[1] G.D. SANDERS, C.J. STANTON, University of Florida, J. WANG, C. SUN, J. KONO, Rice University, A. OIWA, H. MUNEKATA, Tokyo Institute of Technology — We model generation and propagation of coherent acoustic phonons in two color time resolved reflectivity experiments on ferromagnetic InMnAs quantum wells with thick GaSb barriers grown on a GaAs substrate. Carriers are created in the InMnAs by ultrafast pumping below the GaSb band gap while differential reflectivity is measured above the GaSb gap. The electronic states in the ferromagnetic InMnAs 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 electron-phonon interaction with photogenerated carriers. These propagate into the GaSb bulk layer at the LA sound speed modifying the optical properties of the GaSb layer and giving rise to an oscillatory component in the differential reflectivity with a period of ~ 23 ps.

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