

Abstract Submitted
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Coupled Plasmon Phonon Dynamics in GaP: an indirect gap polar semiconductor.¹ AVINASH RUSTAGI, EVAN M. THATCHER, CHRISTOPHER J. STANTON, Univ of Florida - Gainesville, KUNIE ISHIOKA, National Institute for Materials Science, Tsukuba, Japan, KRISTINA BRIXIUS, ULRICH HOFER, Philipps University, Germany, HRVOJE PETEK, Univ of Pittsburgh — Transient Depletion Field Screening (TDFS) is the dominant mechanism behind coupled plasmon-phonon oscillations in polar semiconductors for above gap photoexcitation. Here the surface field distorting the polar lattice is screened by photoexcited plasma initiating coupled oscillations. These oscillations modify the optical property of the material and are observed in reflectivity measurements. We model these oscillations via a set of coupled differential equations in electronic polarization and lattice polarization. We consider the effects of lateral inhomogeneity and diffusion of photoexcited carriers which is crucial to understand the experimental results. The spectrum shows an LO(Longitudinal Optical) phonon peak alongside a LOPC(Longitudinal Optical Plasmon Coupled) peak. Lateral inhomogeneity accounts for the beating phenomenon between these frequencies.

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