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Session F12: Electronic Structure: Thermodynamic and Optical Properties
8:00 AM–10:48 AM, Tuesday, March 15, 2022
Room: McCormick Place W-181C

Chair: Lei Kerr, FIAP

Abstract: F12.00010 : Time Resolved Carrier Dynamics in Ge Based Heterostructures Grown on GaAs Substrate*
9:48 AM–10:00 AM

← Abstract →

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While germanium has long been an important player in microelectronics, strain-engineered germanium heterostructures have recently gained increased attention for fast switching applications. This has provided motivation for understanding the ultrafast carrier dynamics on femtosecond time scales. Time resolved pump-probe spectroscopy is an excellent tool to provide insight into the fundamental interactions, and microscopic dynamics of electrons, holes, phonons and impurities. In this study we present new insights into carrier dynamics and the effect of strained interfaces in several different Ge based heterostructures. These include high quality films grown on InGaAs and AlSb with GaAs as the substrate materials. Our studies were performed in two different optical excitation regimes. In one regime, both the pump/probe were tuned in near infrared (NIR) which allowed us to study the dynamics of the photoexcited carriers near the surface using differential reflectivity measurements. In the second regime, we employed a two-color differential transmission scheme where the pump pulses were in the NIR and we probed the transient carrier dynamics in the Mid-IR. This scheme provided us with direct information on the relaxation of photoexcited dynamics near the Ge band edge, using 100 fetmoscecond laser excitaions.

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