Abstract Submitted
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Resolving sub-phonon wavelength superlattices using photoacoustic spectroscopy[1] JEREMY CURTIS, University of Alabama at Birmingham, ANDREW STEIGERWALD, Vanderbilt University, JOHN RENO, CINT, Sandia National Laboratory, DAVID HILTON, University of Alabama at Birmingham, NORMAN TOLK, Vanderbilt University — We have investigated the coherent acoustic phonon spectroscopic response of a mutilayer GaAs/$Al_xGa_{1-x}As$/AlAs heterostructure with varying layer thickness and Al concentration. The optical response shows a low frequency effective Brillouin oscillatory response and an additional time-dependent change in reflectivity arising from the multilayer features. We can also resolve structural features less than the spatial width of the acoustic strain pulse. We model the optical response from each feature and develop general criteria of the layer thickness and the acoustic strain width that determine the total response. This allows us to determine whether the optical response of a given layer will be superimposed on the overall Brillouin response or will provide an individual Brillouin response from within the layer. Our results help provide a basis for a nondestructive method of determining material properties in stratified media.

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