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**Coherent Phonons in Semiconductor Nanowires** PIERRE-ADRIEN MANTE, YU-CHEN LIU, NICKLAS ANTTU, SEBASTIAN LEHMANN, MAGNUS T. BORGSTROM, KIMBERLY A. DICK, ARKADY YARTSEV, Lund Univ/Lund Inst of Tech — The low dimensionality of nanowires drastically modifies phonon propagation and scattering. As a consequence nanowires has been intensively studied for various applications: size dependent thermal transport, thermoelectricity or nano-sized acoustic transducer. Despite these breakthroughs, there are still questions surrounding phonon transport in nanowires, from scattering to velocity. It is thus critical to achieve an understanding of the frequency dependent behaviour of phonons in these structures to get insights into thermal transport. After giving a brief introduction of the picosecond acoustic technique, we will present observations of propagating acoustic phonons in nanowires superlattices that highlight the strong modifications of phonon dispersion relations. We will then focus on the modified coupling of light and sound in nanowires and on the possibility to generate and detect phonon of specific polarization and frequency. Finally, we will demonstrate the possibility to perform the complete elasticity tensor characterization of nanowires thanks to the control over phonon generation. Our results provide a novel method to explore the frequency dependent phonon scattering processes and thus obtain microscopic insights into thermal transport.

Pierre-Adrien Mante
Lund Univ/Lund Inst of Tech

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