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Acoustic transport and electron phonon interaction in nanorod array MASASHI YAMAGUCHI, JIANXUN LIU, PEI-I WANG, Department of physics, Rensselaer Polytechnic Institute, DEXIAN YE, Department of physics, Virginia Commonwealth University, TOH-MING LU, Department of physics, Rensselaer Polytechnic Institute — Coherent acoustic transport through vertically grown nanorod array on substrate and electron phonon interactions are experimentally studied by using femtosecond laser spectroscopy and glancing angle deposition technique. We have designed a model structure to study the phonon transport along the long axis of nanorods with the use of acoustic spectroscopy. We have experimentally observed the transport of the acoustic pulse with comparable wave length to the diameter of the nanorod, and damping due to the coupling of propagating acoustic phonon to the eigen mode of nanorod (bending motion). Electron-phonon interaction in copper nanorod arrays was studied using ultrafast transient reflectivity spectroscopy with both resonant and off-resonant probe to d-band to Fermi-level transition. Slanted nanorod arrays 10 nm - 50 nm in diameter were fabricated by newly developed deposition technique. The use of a variable probe wavelength over the transition energy range suggested the modification of electronic structure in slanted nanorod arrays with relatively large diameter.

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