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# progress on coherent generation of terahertz acoustic phonons by resonant absorption of nanosecond-pulsed far-infrared laser radiation in silicon doping superlattices

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We report progress on experiments to generate and detect coherent terahertz acoustic phonons. Coherent phonons are generated[1] in a silicon-doping superlattice by the absorption of grating-coupled high peak-power cavity-dumped far-infared laser radiation[2]. The superlattice period is chosen to match the phonon wavelength at the excitation frequency of the laser radiation. The phonons propagate across the Si:B substrate and are detected by a novel superconducting granular aluminium/palladium bilayer microbolometer[3] with sub-nanosecond resolution. The phonon spectrum is obtained by piezo-phonon spectroscopy[4] via the boron impurities in the silicon substrate.

(1) P. Ruden and G.H. Dohler, "Anistropy Effects and Optical Excitation of Acoustic Phonons in n-i-p-i Doping Superlattices", Solid State Commun. 45 (1), 23 (1983). (2) T.E. Wilson, "A High-Power NH3 Laser Pumped in a Three-Mirror CO2 Laser Cavity with Optically-Switched Cavity-Dumping", International Journal of Infrared and Millimeter Waves 14 (2), 303 (1993). (3) T E Wilson, "Fabrication and characterization of granular aluminum/palladium bilayer microbolometer", Meas. Sci. Technol. 18 N53-N59 (2007). (4) S. Roshko and W. Dietsche, "Phonon Spectroscopy in High Magnetic Fields: The B+ Center in Si", Solid State Comm. 98(5), 453 (1996).