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标题: Detecting optically synthesized quasi-monochromatic sub-terahertz phonon wavepackets by ultrafast x-ray diffraction
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摘要: We excite an epitaxial SrRuO3 thin film transducer by a pulse train of ultrashort laser pulses, launching coherent sound waves into the underlying SrTiO3 substrate. Synchrotron-based x-ray diffraction (XRD) data exhibiting separated sidebands to the substrate peak evidence the excitation of a quasi-monochromatic phonon wavepacket with sub-THz central frequency. The frequency and bandwidth of this sound pulse can be controlled by the optical pulse train. We compare the experimental data to combined lattice dynamics and dynamical XRD simulations to verify the coherent phonon dynamics. In addition, we observe a lifetime of 130 ps of such sub-THz phonons in accordance with the theory. (C) 2012 American Institute of Physics. [http://dx.doi.org/10.1063/1.3688492]
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