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标题: Raman generation of coherent phonons of anatase and rutile TiO2 photoexcited at fundamental absorption edges
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摘要: Ultrafast phonon dynamics in anatase and rutile TiO2 single crystals are investigated using 400 nm near ultraviolet light pulses, whose wavelength corresponds to the fundamental absorption edges of both polymorphs. Raman-active phonon modes are observed as coherent modulations in THz frequency range of the reflected light intensity. Coherent amplitudes vary as the crystals are rotated with respect to the pump and probe polarizations, depending on the symmetry of the phonon modes. The polarization dependence is quantitatively reproduced by assuming that both the generation and detection are dominated by the Raman scattering process. No evident resonance enhancement is observed in the coherent amplitudes as we vary the excitation light wavelength around the fundamental absorption edges. These results indicate that the creation of coherent bulk phonons by photodoped carriers is negligible compared with the competing Raman process at the fundamental band gap excitation.
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