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Title:Photogenerated-carrier-induced band bending effects on generation of a coherent longitudinal optical phonon in a GaAs buffer layer optically masked by a GaSb top epitaxial layer
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Abstract:We demonstrate that, in a GaSb/GaAs epitaxial structure, the coherent longitudinal optical (LO) phonon in a GaAs buffer layer optically masked by a GaSb top layer is observed utilizing terahertz spectroscopy. It is confirmed from Raman scattering measurements that only the optical phonons in the GaSb layer is observable. In the terahertz-wave measurement, the Fourier power spectrum of a terahertz waveform exhibits both the coherent GaAs and GaSb LO phonon bands; namely, the coherent LO phonon in the optically masked GaAs buffer layer is observed. This fact demonstrates that the instantaneous surface potential modulation, which originates from the impulsive carrier excitation by a pump beam, reaches the GaAs buffer layer. We perform a time-partitioning Fourier transform analysis in order to investigate the decay dynamics of the coherent GaAs and GaSb LO phonons. © 2012 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.
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