357. Title:Emission of the terahertz electromagnetic wave from coherent longitudinal optical phonons in a GaAs buffer layer optically masked by a GaSb top epitaxial layer
Authors:Takeuchi, Hideo (1); Tsuruta, Syuichi (2); Nakayama, Masaaki (2)
Source title:Applied Physics Letters
Volume:98
Issue:15
Issue date:April 11, 2011
Publication year:2011
Language:English
Document type:Journal article (JA)
Abstract:We demonstrate that, in a GaSb/GaAs epitaxial structure, the coherent longitudinal optical (LO) phonon in the GaAs layer optically masked by the GaSb top layer is observed utilizing terahertz- electromagnetic-wave spectroscopy. It is confirmed from a Raman scattering measurement that only the optical phonon in the GaSb layer is optically observable, where the photon energy of the excitation laser beam was almost the same as that of the femtosecond pulse pump beam for the terahertz wave measurement. In the terahertz wave measurement, the Fourier power spectrum of the terahertz waveform exhibits both the GaAs and the GaSb LO phonons; namely, the coherent LO phonon in the optically masked GaAs buffer layer is observed in the terahertz wave measurement. This fact demonstrates that the instantaneous surface potential modulation originating from the impulsive carrier excitation by the pump pulses reaches the GaAs buffer layer. Consequently, the above-mentioned surface potential modulation generates the coherent GaAs LO phonon.