
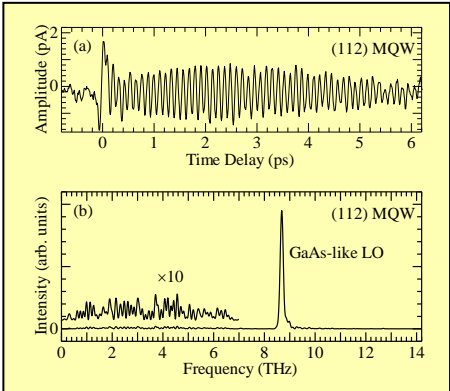


Requests for Collaboration

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<p>Research Interests</p> <ul style="list-style-type: none"> ● Terahertz time-domain spectroscopy of coherent longitudinal optical (LO) phonons and LO-phonon plasmon coupled mode ● Photoreflectance spectroscopy for non-destructive characterization of epiwafers for electronic and/or optical devices 	
<p>Creative Achievements in The Application of New and Existing Science and Technology</p>	
<p>(1) Terahertz electromagnetic wave radiated from coherent longitudinal optical (LO) phonons, -ensembles of LO phonons oscillating in phase-, provide information on time-domain characteristics such as decay time and phase. We have demonstrated quasi-monochromatic terahertz-wave utilizing GaAs-like coherent LO phonons from (11n)-oriented In_{0.1}Al_{0.9}GaAs/GaAs multiple quantum wells. Figures 1(a) and 1(b) shows the observed terahertz time-domain wave and its Fourier power spectra (frequency-domain signal).</p>	
<p>(2) The phenomenon of Franz-Keldysh oscillations in photoreflectance spectra connects with a built-in electric field in semiconductor epitaxial layers. We have demonstrated the method for estimating the surface Fermi level and surface recombination velocity from the built-in electric field.</p>	
<p>Technology (Product, Process, Device, Service etc.) That I Want to Request for Collaboration</p>	
<ul style="list-style-type: none"> ● Application of terahertz waves from coherent LO phonons and LO-phonon-plasmon coupled mode to industry fields such as wireless communications (5~10 THz range) . ● Reliability and/or surface diagnosis testers using photoreflectance spectroscopy. 	
<p>A List of 5 Key Publications</p>	
<ul style="list-style-type: none"> • "Longitudinal Optical Phonon-Plasmon Coupled Mode in Undoped GaAs/n-type GaAs Epitaxial Structures Observed by Raman Scattering and Terahertz Time-Domain Spectroscopic Measurements: Difference in Observed Modes and Initial Polarization Effects". <u>H. Takeuchi</u>, T. Sumioka, and M. Nakayama. <i>IEEE Trans. THz Sci. Technol.</i> vol.7, pp.124-130 (2017). • "Intense monochromatic terahertz electromagnetic waves from coherent GaAs-like longitudinal optical phonons in (11n)-oriented GaAs/In_{0.1}Al_{0.9}As strained multiple quantum wells". <u>H. Takeuchi</u>, S. Asai, S. Tsuruta, and M. Nakayama. <i>Appl. Phys. Lett.</i> vol.100, 242107 1-4 (2012). • "Terahertz spectroscopy of dynamics of coupling between the coherent longitudinal optical phonon and plasmon in the surge current of instantaneously photogenerated carriers flowing through the i-GaAs layer of an i-GaAs/n-GaAs epitaxial structure". <u>H. Takeuchi</u>, S. Tsuruta, and M. Nakayama. <i>J. Appl. Phys.</i> vol. 110, 013515 1-6 (2011). <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> • "High sensitivity of Franz-Keldysh oscillations in photoreflectance spectra for probing morphology in Al_xGa_{1-x}N/GaN heterostructures". <u>H. Takeuchi</u>, Y. Yamamoto, Y. Kamo, T. Kunii, T. Oku, S. Wakaiki, and M. Nakayama. <i>Eur. Phys. J. Appl. Phys.</i> vol. 37, pp. 119-122 (2007). • "Photovoltaic effects on Franz-Keldysh oscillations in photoreflectance spectra: application to determination of surface Fermi level and surface recombination velocity in undoped GaAs/n-type GaAs epitaxial layer structures". <u>H. Takeuchi</u>, Y. Kamo, Y. Yamamoto, T. Oku, M. Totsuka, and M. Nakayama. <i>J. Appl. Phys.</i> vol.97, 063708 1-16 (2005). 	