

317

Accession number:20123615393652

Title:Mid-infrared time-domain ellipsometry: Application to Nb-doped SrTiO<sub>3</sub>

Authors:Rubano, Andrea (1); Braun, Lukas (1); Wolf, Martin (1); Kampfrath, Tobias (1)

Author affiliation:(1) Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

Corresponding author:Rubano, A.(rubano@fhi-berlin.mpg.de)

Source title:Applied Physics Letters

Abbreviated source title:Appl Phys Lett

Volume:101

Issue:8

Issue date:August 20, 2012

Publication year:2012

Article number:081103

Language:English

ISSN:00036951

CODEN:APPLAB

Document type:Journal article (JA)

Publisher:American Institute of Physics, 2 Huntington Quadrangle, Suite N101, Melville, NY 11747-4502, United States

Abstract:We present a method for determining the dielectric function of opaque materials precisely and reproducibly in the frequency range from 8 to 30 THz and higher. Our approach is based on measuring the polarization- and phase-resolved THz electrical transients reflected by the sample. This mid-infrared time-domain ellipsometry is applied to pure and Nb-doped strontium titanate SrTiO<sub>3</sub>, which allows us to infer the longitudinal and transverse optical phonon frequencies and the free-carrier plasma frequency as a function of the charge carrier concentration. We extract and discuss the value of the effective mass of the charge carriers. © 2012 American Institute of Physics.

Number of references:24

Main heading:Time domain analysis

Controlled terms:Charge carriers - Dielectric materials - Ellipsometry - Infrared devices - Plasma waves - Power quality - Strontium titanates

Uncontrolled terms:Dielectric functions - Effective mass - Electrical transients - Free-carrier plasmas - Frequency ranges - Midinfrared - Nb-doped SrTiO - Opaque materials - SrTiO - Time domain - Transverse optical phonons

Classification code:921 Mathematics - 804 Chemical Products Generally - 741.3 Optical Devices and Systems - 932.3 Plasma Physics - 741.1 Light/Optics - 706.1.2 Electric Power Distribution - 701.1 Electricity: Basic Concepts and Phenomena - 708.1 Dielectric Materials

DOI:10.1063/1.4746263

Database:Compendex

Compilation and indexing terms, Copyright 2012 Elsevier Inc.