

261. Title: Measurement of the dielectric constant of thin films by terahertz time-domain spectroscopic ellipsometry

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Abstract: We present a reflection-type terahertz time-domain spectroscopic ellipsometry (THz-TDSE) technique for measuring the complex dielectric constants of thin-film materials without replacement of the sample. THz-TDSE provides complex dielectric constants from the ratio of the complex amplitude reflection coefficients between p- and s-polarized THz waves. The measured dielectric constants of doped GaAs thin films show good agreement with predictions of the Drude model, even though the film thickness is of the order of a tenth of the penetration depth of the THz waves. In addition, we demonstrate the measurements of soft-phonon dispersion in SrTiO₃ thin films deposited on a Pt layer. The obtained dielectric constants agree well with the predictions of a generalized harmonic oscillator model.