DEVELOPMENT AND APPLICATION OF A HIGHER RESOLUTION TERAHERTZ TIME-DOMAIN SPECTROMETER

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We will present on our development and application of a terahertz (THz) time-domain spectrometer employing asynchronous optical sampling (ASOPS) between two Ti:Sapphire ultrafast lasers operating at a repetition rate of approximately 80MHz, and we thus demonstrate a THz frequency resolution approaching the limit of that repetition rate. This is an order of magnitude improvement in resolution over typical THz time-domain spectrometers. The improved resolution is important for our primary effort of collecting THz spectra for far-infrared astronomy. We will report on various spectroscopic applications including the THz rotational spectrum of water and low frequency pseudorotational modes in tetrahydrofuran. Further, we will demonstrate the related use of the ASOPS virtual delay line in an all-optical transient thermoreflectance experiment for quickly measuring the thermal conductivity of various semiconductor materials.