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Title:Low-temperature THz time domain waveguide spectrometer with butt-coupled emitter and detector crystal
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Abstract:A compact high-resolution THz time-domain waveguide spectrometer that is operated inside a cryostat is demonstrated. A THz photo-Dember emitter and a ZnTe electro-optic detection crystal are directly attached to a parallel copper-plate waveguide. This allows the THz beam to be excited and detected entirely inside the cryostat, obviating the need for THz-transparent windows or external THz mirrors. Since no external bias for the emitter is required, no electric feed-through into the cryostat is necessary. Using asynchronous optical sampling, high resolution THz spectra are obtained in the frequency range from 0.2 to 2.0 THz. The THz emission from the photo-Dember emitter and the absorption spectrum of 1,2-dicyanobenzene film are measured as a function of temperature. An absorption peak around 750 GHz of 1,2-dicyanobenzene displays a blue shift with increasing temperature. © 2012 Optical Society of America.
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