CHIRPED-PULSE TERAHERTZ SPECTROSCOPY FOR BROADBAND TRACE GAS SENSING

EYAL GERECHT, KEVIN O. DOUGLASS, DAVID F. PLUSQUELLIC, *NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, OPTICAL TECHNOLOGY DIVISION, GAITHERSBURG, MD 20899*.

Recently developed solid state sources and heterodyne detectors for the terahertz frequency range have made it possible to generate and detect precise digitally synthesized waveforms at THz frequencies with ultra-low phase noise. The sample gas is polarized using sub-μs chirped THz pulses and both the absorption and the free inductive decay (FID) signals are detected using a mixer amplifier multiplier chain. This approach allows for a rapid broadband multi-component detection with low parts-per-billion sensitivities and high frequency accuracy. Current acquisition time is 30 seconds for 10.6 GHz of bandwidth. Such a system can be configured into a portable, robust, and easy to use sensing platform. A full description of broadband trace gas sensor operating at 540 GHz to 620 GHz will be presented.