A HIGH RESOLUTION TERAHERTZ SPECTROMETER FOR CHEMICAL DETECTION

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Goodrich has developed a high resolution, broad band spectrometer that operates in the Terahertz (THz) region of the spectrum with the intent of performing chemical detection. THz spectroscopy exploits rotational resonances for gas phase detection. High resolution THz spectroscopy can improve detection and identification through increased probability of detection and reduced false alarms. The Goodrich THz spectrometer is based upon CW photomixer technology in a heterodyne configuration. The current Goodrich design offers continuous tunability across a 0.1 to 1.2 THz frequency range. One of the unique aspects of the Goodrich spectrometer is laser system control that has demonstrated difference frequency line widths and repeatability at the MHz level. The spectrometer design enables high THz energy densities with narrow line widths tunable over a broad spectrum. The system has demonstrated SNR better than a cryogenically cooled hot electron bolometer. This capability allows the Goodrich system to accurately determine absorption signatures of multiple chemicals. Goodrich has completed various phases of system testing and performance verification. The spectrometer was tested against various toxic industrial chemicals. Data for HCN, HCl, NH3, and SO2 will be presented.