ANALYTICAL CHEMICAL SENSING IN THE SUBMILLIMETER/TERAHERTZ SPECTRAL RANGE

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Highly sensitive and selective Terahertz sensor utilized to quantitatively analyze a complex mixture of Volatile Organic Compounds is reported. To best demonstrate analytical capabilities of THz chemical sensors we chose to perform analytical quantitative analysis of a certified gas mixture using a novel prototype chemical sensor that couples a commercial preconcentration system (Entech 7100A) to a high resolution THz spectrometer. We selected Method TO-14A certified mixture of 39 volatile organic compounds (VOCs) diluted to 1 part per million (ppm) in nitrogen. 26 of the 39 chemicals were identified by us as suitable for THz spectroscopic detection. Entech 7100A system is designed and marketed as an inlet system for Gas ChromatographyMass Spectrometry (GC-MS) instruments with a specific focus on TO-14 and TO-15 EPA sampling methods. Its preconcentration efficiency is high for the 39 chemicals in the mixture used for this study and our preliminary results confirm this. Here we present the results of this study which serves as basis for our ongoing research in environmental sensing and analysis of exhaled human breath.