DIAGNOSTIC CHEMICAL ANALYSIS OF EXHALED HUMAN BREATH USING A NOVEL SUB-MILLIMETER/TERAHERTZ SPECTROSCOPIC APPROACH

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As many as 3000 chemicals are reported to be found in exhaled human breath. Many of these chemicals are linked to certain health conditions and environmental exposures. Present state of the art techniques used for analysis of exhaled human breath include mass spectrometry based methods, infrared spectroscopic sensors, electro chemical sensors and semiconductor oxide based testers. Some of these techniques are commercially available but are somewhat limited in their specificity and exhibit fairly high probability of false alarm. Here, we present the results of our most recent study which demonstrated a novel application of a terahertz high resolutions spectroscopic technique to the analysis of exhaled human breath, focused on detection of ethanol in the exhaled breath of a person which consumed an alcoholic drink. This technique possesses nearly "absolute" specificity and we demonstrated its ability to uniquely identify ethanol, methanol, and acetone in human breath. This project is now complete and we are looking to extend this method of chemical analysis of exhaled human breath to a broader range of chemicals in an attempt to demonstrate its potential for biomedical diagnostic purposes.