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Exploration of detection sensitivity of biomarker acetone in aqueous samples using cavity ringdown spectroscopy ARMSTRONG MBI, CHUJI WANG[1], Department of Physics and Astronomy, Mississippi State University — Breath acetone is a biomarker for diabetes (Type 1). Currently, high sensitivity breath gas analysis is mainly performed by gas chromatography-mass spectrometry (GC-MC). We are developing a potable ringdown spectrometer for diabetes diagnostics using non-invasive breath gas analysis. The ringdown spectrometer consists of a compact Nd: YAG laser source operating at 266 nm, a atmospheric gas cell of 43 cm in length, a miniature detector, and a data processing section. In this work, the exploration of detection sensitivity of acetone in aqueous samples using cavity ringdown spectroscopy is presented. Pure acetone is diluted in distilled water in different concentrations ranging from 0.5 drop/liter to 8 drops/liter, or 730 ppbv - 12 ppmv in gas phase. The instrument performance using two sampling methods is evaluated. With the mirror reflectivity of 99.98%, the spectrometer demonstrates a detection limit of acetone of 450 ppbv (based on 1-σ), which is slightly lower than the threshold number of acetone concentration in normal human breath. Preliminary results from actual breath gases are also presented.

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