Comprehensive, Continuous Air Monitoring Applications of SIFT-MS

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This presentation introduces a multi-purpose analytical technique for atmospheric research and routine atmospheric monitoring applications: Selected Ion Flow Tube Mass Spectrometry (SIFT-MS). SIFT-MS is a real-time analytical technique that rapidly analyzes air to ultra-trace levels for volatile organic compounds (VOCs) and inorganic compounds (Prince *et al.*, 2010).

SIFT-MS utilizes three positively charged reagent ions (H_3O^+, NO^+ and O_2^+) and five negatively charged reagent ions (OH^-, O^-, O_2^-, NO_2^- and NO_3^-) to provide very selective analysis via gas-phase chemical separation coupled with mass spectrometric detection. The reagent ions are created from a microwave discharge through moist air and subsequently mass-selected using a quadrupole mass spectrometer. The mass-selected reagent ions are then injected into the flow tube, where they are reacted with the air sample introduced directly and continuously through the sample inlet. Reagent and product ions are separated using a second mass spectrometer and detected with a particle multiplier. SIFT-MS provides a unique ability to conduct highly selective analysis in real-time, by applying multiple rapidly switchable reagent ions and mass spectrometric detection. The outcome is that gaseous pollutants in air are typically monitored at part-per-trillion levels within one second.

We will present continuous monitoring data that demonstrate the ability of SIFT-MS to detect a diverse range of VOCs and inorganic gases that support development or testing of atmospheric models. Data will illustrate the flexibility of the technique, including its ability to be used in full scan mode to identify and quantify non-targeted species.

Reference:
Prince, B.J., Milligan, D.B., & McEwan, M.J. (2010). *Rapid Commun. Mass Spectrom.*, 24, 1763-1769.