ToF-CIMS
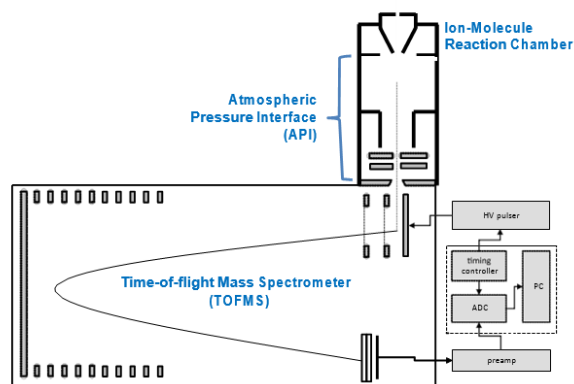## Chemical Ionization Time-of-Flight Mass Spectrometer

Real-time chemical analysis of trace gases, aerosols, or atmospheric ions.

APPLICATIONS

- Online identification and quantification of trace gas- or particle-phase compounds
- Laboratory, field, or mobile platform based experiments
- Air quality and climate change research

ADVANTAGES

- Quantitative response with broad dynamic range
- Sub pptv gas-phase limits of detection
- Molecular identification and elemental speciation
- Interchangeable ionization sources for selective detection of different chemical classes
- High-speed data acquisition
- Low power, field portable assembly

INTERCHANGEABLE INLETS AND IONIZATION SOURCES

The ToF-CIMS is used with three different chemical ionization sources, which can be easily interchanged by the user.

- **Flow Tube Ion Molecule Reaction Chamber (IMR):** Reduced, tuneable pressure (30 to 500 mbar) reaction ionization chamber for use with acetate, iodide, and water cluster reagent ions. Compatible with Po or X-ray ionizer. The standard configuration uses a gas-phase inlet. The IMR can optionally be used with the **FIGAERO Inlet**, which enables real-time chemical analysis of gas and aerosols.
- **Atmospheric Pressure Drift Tube Reaction Chamber:** For use with nitrate reagent ion. Measurement of highly oxidized gas-phase organic compounds. Not compatible with FIGAERO.
- **Extractive Electrospray Ionization Source (EESI):** Ionization source for online molecular analysis of aerosols.

TOF Mass Analyzer

The ToF-CIMS is available in two models that differ in size and mass resolving power.

	Mass Resolving Power (M/ΔM)	Dimensions
HToF-CIMS	4000 - 6000	59 x 42 x 83 cm
LToF-CIMS	7000 - 9000	61 x 48 x 151 cm

Performance and Specifications

- **Gas-Phase LOD:** For example, 4 pptv formic acid (1 s, Bertram, 2011), 0.4 pptv malonic acid (15 s, Lee, 2014)
- **Aerosol LOD, FIGAERO**: For example, 4 ng/m^3 formic acid and 2 ng/m^3 C$_9$ pinene acid (Lopez-Hilfiker, 2014)
- **Aerosol LOD, EESI**: 1 ng/m^3 dipentaerythritol and raffinose (Lopez-Hilfiker and Slowik, in prep)
- **Mass Range**: 0 to 1000 Th
- **Save Rate**: Up to 200 complete mass spectra/second
- **Detection polarity:** Bipolar TOF mass analyzer
- **Power:**
  - ToF-CIMS: <2 kW peak, <1.3 kW steady state
  - FIGAERO: < 0.5 kW
- **Sample Flow Rate:**
  - IMR: 2 lpm
  - FIGAERO: 2 lpm gas, 5 - 15 lpm aerosol
  - Atm Pressure Drift Tube: 10 lpm
  - EESI: 1 lpm

Software

Tofware is an Igor-based post processing software, with workflows for quantification and high-resolution peak fitting and identification.

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