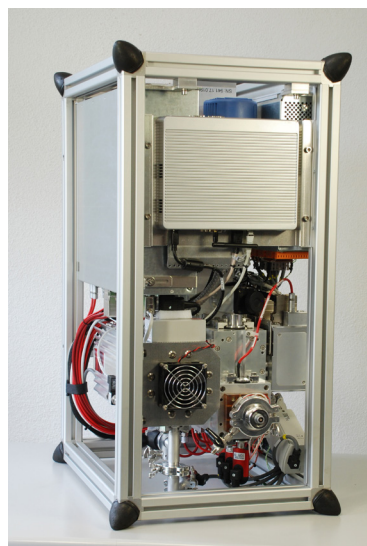
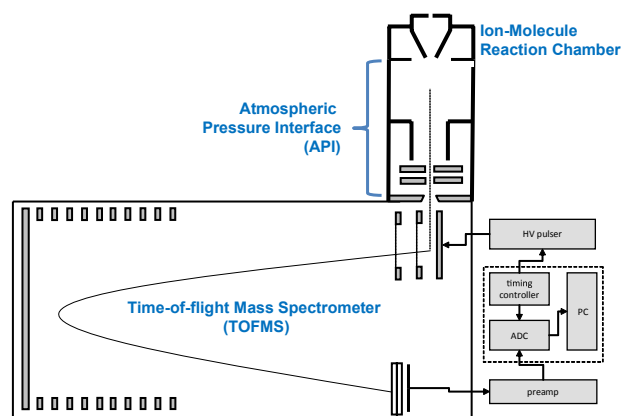




ToF-CIMS

Chemical Ionization Time-of-Flight Mass Spectrometer

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



APPLICATIONS

- Continuous air monitoring.
- Laboratory, field, or mobile platform based experiments.
- Climate change and air quality research.
- Human breath analysis.
- Chemical ionization source hardware compatible with wide range of ion chemistry, including: CH_3COO^- , I^- , SF_6^- , CF_3O^- , $(\text{CH}_3\text{OH})\text{H}^+$, $(\text{H}_2\text{O})_n\text{H}^+$, $\text{O}_2^{+/-}$, and NO^+ .
- Chemical ionization source easily interchanged with atmospheric ion (AI) sampling inlet and nitrate ion source.

ADVANTAGES

- Quantitative response with broad dynamic range. Part per trillion (pptv) gas-phase sensitivity.
- Optional FIGAERO sampler enables simultaneous measurements of gas and particle composition.
- Soft ionization combined with high mass resolving power enables molecular and elemental speciation.
- High ion duty cycle: simultaneous measurement of all mass-to-charge ratios.
- Data acquisition rates exceeding 200 complete mass spectra per second.
- Low power, field portable assembly.
- Choice of two TOFMS platforms. Compact, high sensitivity (CTOF) or high mass resolving power (HTOF).



ToF-CIMS

PERFORMANCE

	Resolving Power ($M/\Delta M$)	Limit of Detection, Formic Acid (gas)	Relative Sensitivity
CTOF	900-1200	4 pptv (Bertram, 2011)	100%
HTOF	4000-7500	--	10-25%

Mass-to-charge range	m/Q 0-1200, positive or negative ion
Aerosol LOD	100 pg pure material (MOVI with HTOF)
Sample flow	2 L/min (gas phase) / 10 L/min (MOVI)
Data rates	Up to 200 mass spectra/sec
Data format	HDF5

COMPONENTS

- Ion-molecule reaction (IMR) chamber
 - Tunable pressure
 - Two ports for Po-210 ion sources (reagent ion generation)
- (Optional) Filter inlet for gases and aerosol (FIGAERO)
- (Optional) Atmospheric ion sampling inlet. Easily interchanged with IMR chamber
- Atmospheric pressure interface
 - 5-stage differential pressure vacuum system
 - Collisional declustering chamber (CDC)
 - RF and DC focusing optics
 - Adaptable for other high pressure ionization schemes
- Bipolar TOF mass spectrometer (CTOF or HTOF)
- Vacuum pumps and pressure gauges provided
- Data acquisition system
 - Windows PC with acquisition and control software
 - High speed analog-to-digital converter (ADC)
- Igor-based data analysis software
 - Graphical data browser, calibration routines, high resolution peak fitting

REFERENCES

(CI-TOFMS) Bertram, et al. A field-deployable chemical ionization time-of-flight mass spectrometer, Atmos. Meas. Tech., 4, 1471-1479. 2011.

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(Atmospheric Ions) Junninen, et al. A high-resolution mass spectrometer to measure atmospheric ion composition, Atmos. Meas. Tech., 3, 1039-1053, 2010.