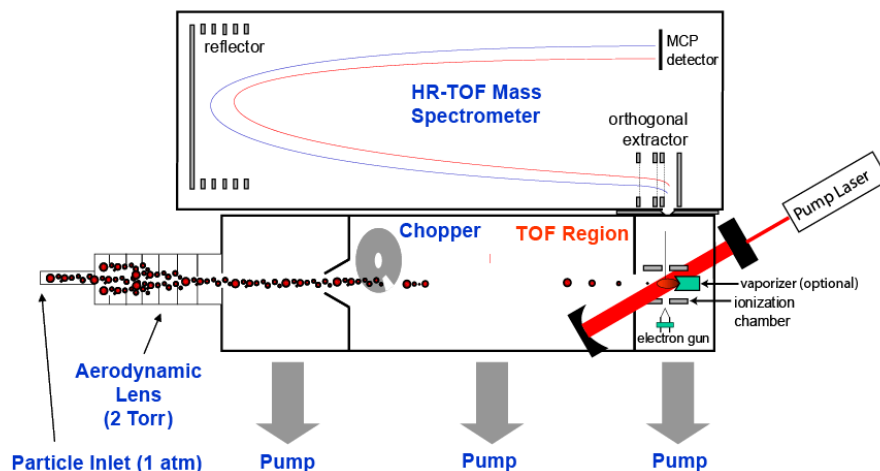




SP-AMS

Soot Particle - Aerosol Mass Spectrometer

Real-time size, mass, and chemical composition measurements of black carbon containing particles.



APPLICATIONS

- Climate change and air quality research.
- Combustion exhaust monitoring and source characterization.
- Black carbon containing particle quantification and analysis.
 - Mass loading, size distribution, and chemical composition information for black carbon and organic and inorganic components on black carbon containing particles
 - PMF analysis
 - Elemental composition (O:C, H:C, EC:OC)
- Fast response plume studies up to 100 Hz.
- Mobile measurements from ship, truck and aircraft platforms.
- Metal nanoparticle research.

ADVANTAGES

- Black carbon particles are vaporized using intracavity laser absorption (1064 nm) and analyzed using electron impact ion source and high resolution, time-of-flight mass spectrometry.
- Laser vaporization is selective for black carbon and metal containing particles.
- Simultaneous operation with laser and standard tungsten vaporizer allows for detection and characterization of all major submicron ambient particle types (excluding uncoated dust and sea salt particles).

SP-AMS VERSIONS:

- SP-AMS standalone instrument.
- SP module for upgrading any existing Aerodyne AMS.

COLLABORATIVE PARTNER:

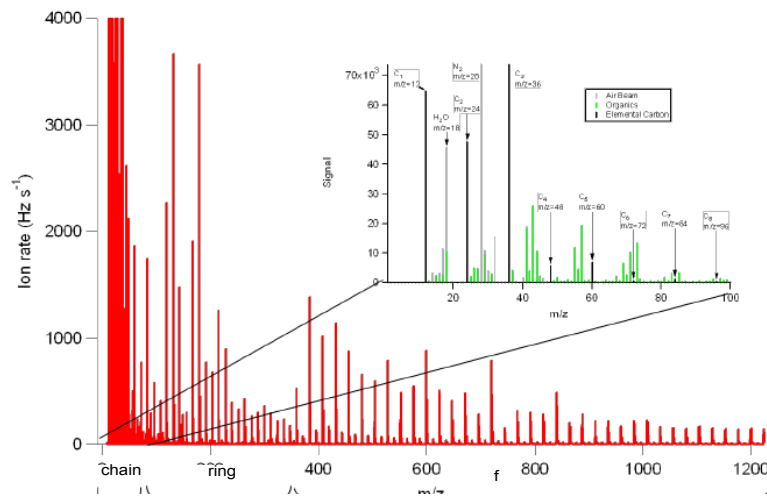
- Droplet Measurement Technology
2545 Central Avenue
Boulder, CO 80301



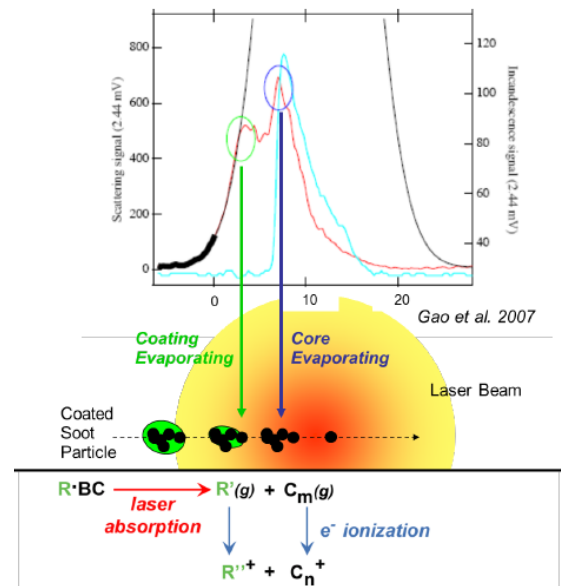
Soot Particle Aerosol Mass Spectrometer (SP-AMS) SP MODULE SPECIFICATIONS

- Data Acquisition System:** Custom acquisition and analysis software built upon standard HR-AMS software
- Laser Vaporizer:** Intracavity 1064 nm Nd: YAG laser with CCD camera for laser profile imaging
- Dimensions/Weight/Power:** Minimal impact on standard HR-TOF-AMS specifications
- Sensitivity:** Refractory Black Carbon
SP-AMS (V-mode) > 140 carbon ions/picogram
- Detection Limit:** Refractory Black Carbon
(1 minute, 30) SP-AMS (V-mode) detection limit = 30 ng/m³, detection limits on chemical species: organic DL is ~60 ng/m³, sulfate DL is ~2 ng/m³.

BLACK CARBON ION SPECTRA MEASUREMENTS



LASER VAPORIZATION PROCESS



REFERENCES

Onasch, T. B.; Trimborn, A.; Fortner, E. C.; Jayne, J. T.; Kok, G. L.; Williams, L. R.; Davidovits, P.; Worsnop, D. R. Soot Particle Aerosol Mass Spectrometer: Development, Validation, and Initial Application. *Aerosol Science and Technology* 2012, 46, 804–817.