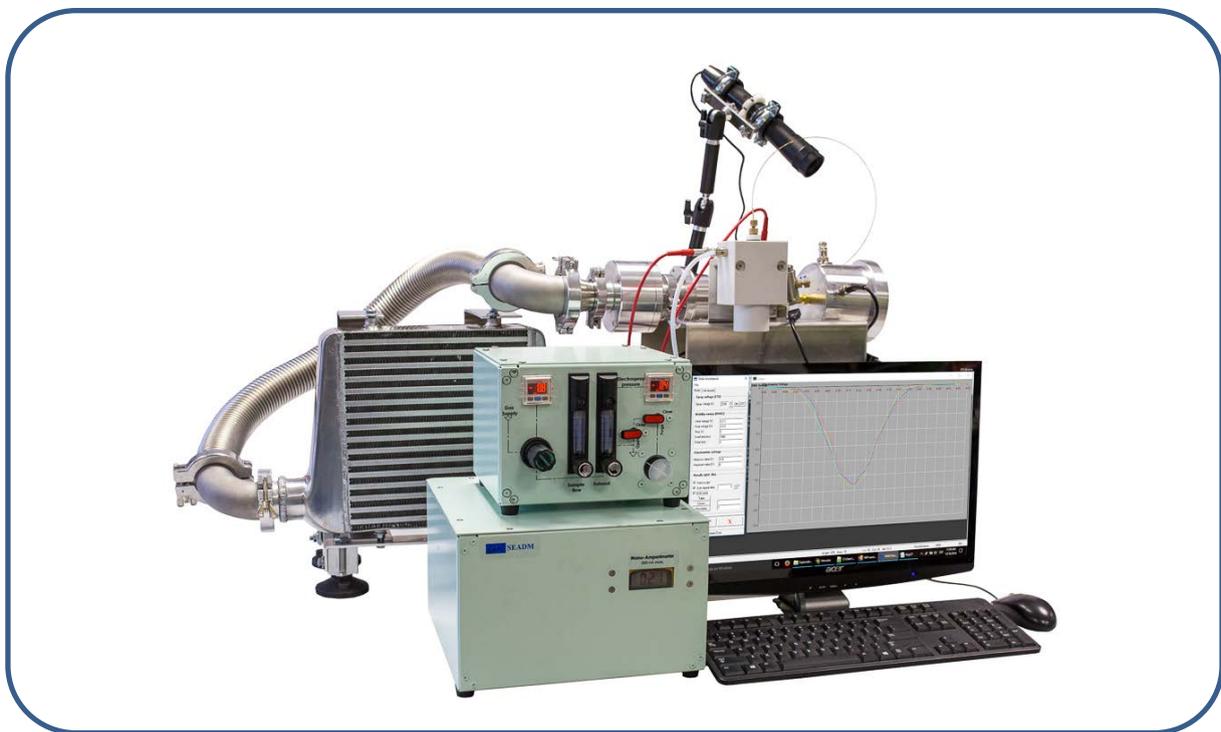
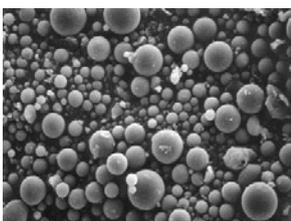


SEADM

Half Mini (m) model Differential Mobility Analyzer



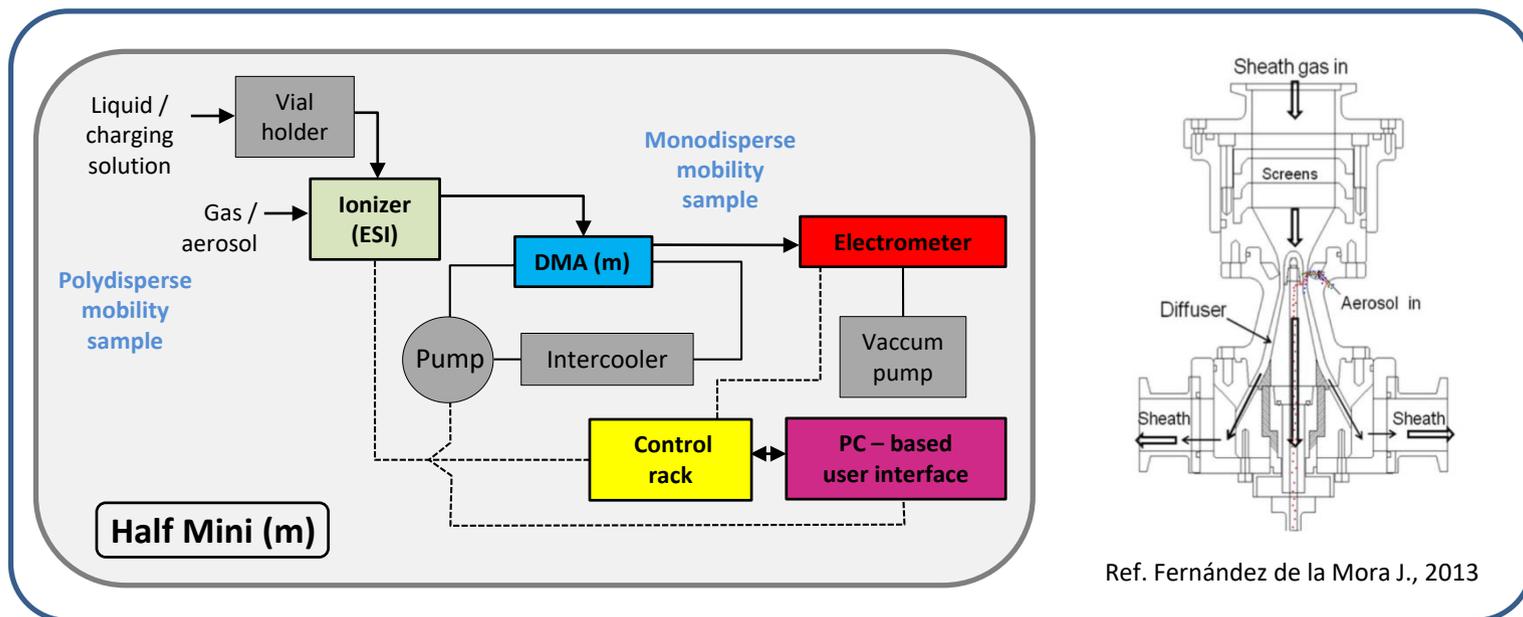
**High resolution analysis
of nano-particles and molecules**



Half Mini (m) model

A portable DMA for high-resolution classification of 1 nm particles

The **Half-Mini DMA** is the most recent and lightest (3.2 kg) member of a class of Yale-developed supercritical DMAs, later improved by SEADM, able to isolate with high resolution aerosol particles as small as 1 nm (including molecular ions). Its broad range of particle sizes (1-30 nm) is achieved with a single DMA configuration (2 cm long working section), greatly simplifying operation.



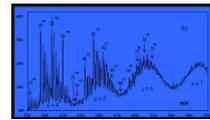
In the **Half Mini** system, the molecules or particles are ionized in an electro-spray ionization chamber and then submitted simultaneously to a gas flow and an electric field within the cylindrical **Differential Mobility Analyzer (DMA)**. Only the particles or ions with a specific mobility are transmitted into the DMA outlet.

What makes the **Half Mini** system unique is its laminar flow even in the presence of high flow rates (high Reynolds numbers), which avoids undesirable effects (such as diffusion broadening and turbulence-related effects), delivering unrivalled resolutions.

The system includes an ionizer (incl. vial holder), the DMA, (with its corresponding pump), an intercooler, an electrometer, a vacuum pump, a control rack featuring all control electronics, software and a PC user interface.

Acquisition of fast size spectra: A key advantage of the **Half Mini** DMAs, either (p) or (m) models, over other existing DMAs is its ability to complete mobility spectra exceptionally fast without distortion of the size distribution. This advantage is due in part to the minimal particle residence time in the classification region (0.2 -2 ms), as well as to the high resolving power of the instrument (which yields almost the same residence time to all particles over the whole size range). Undistorted size spectra from 1 nm to 30 nm can therefore be obtained every 2 s [[Fernandez de la Mora, Aer. Sci. Tec., accepted, Jan-2017](#)].

Read our customer review for the Half Mini at:
<http://www.seadm.com/customer-reviews/>



Advantages and features

- Highest resolutions available in the market (see results of independent studies on the right)
- Excellent transmission for enhanced sensitivity, see right (internal semiconducting tube bringing the classified particles to the grounded outlet)
- Safe operation (internally protected high voltage)
- Optimized flow dynamics technology to ensure laminarity even at high ($Re > 50000$) flow
- Diffusion broadening minimized
- Robust architecture, mirror polishing, total thermal control
- Stand alone operation (control and monitorization units built-in) directly connected to PC-USB.

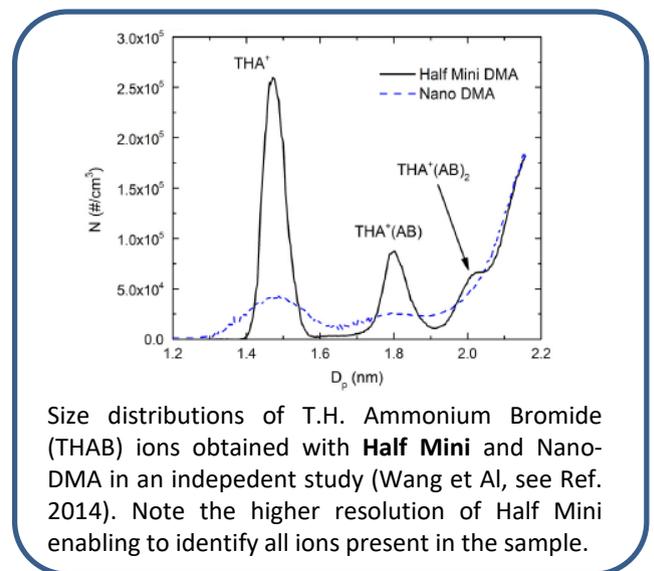
Applications and sectors

The instrument has been widely used for studies of Condensation Particle Counters (CPCs) sensitive to particles smaller than 3 nm, and other investigations involving pure nanometer size standards.

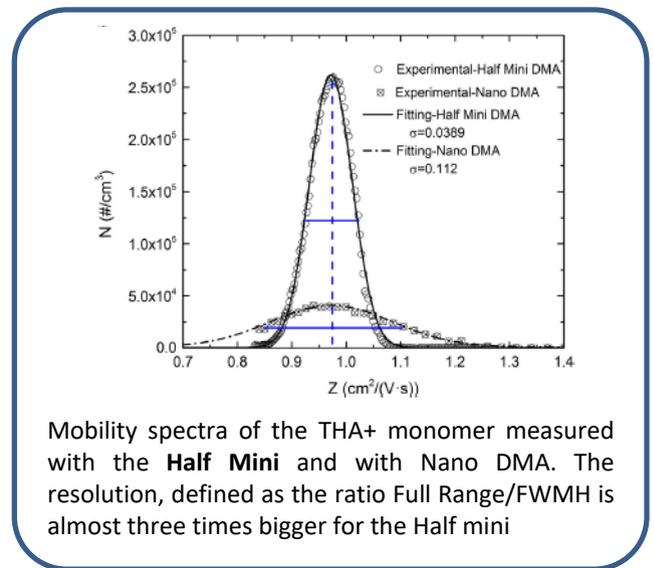
For users having a charge-reduction component (also available from SEADM), the increased size range of this DMA (relative to earlier supercritical DMAs) permits high resolution analysis of charge-reduced biomolecules and small viruses produced by electrospray.

Range of **applications** include:

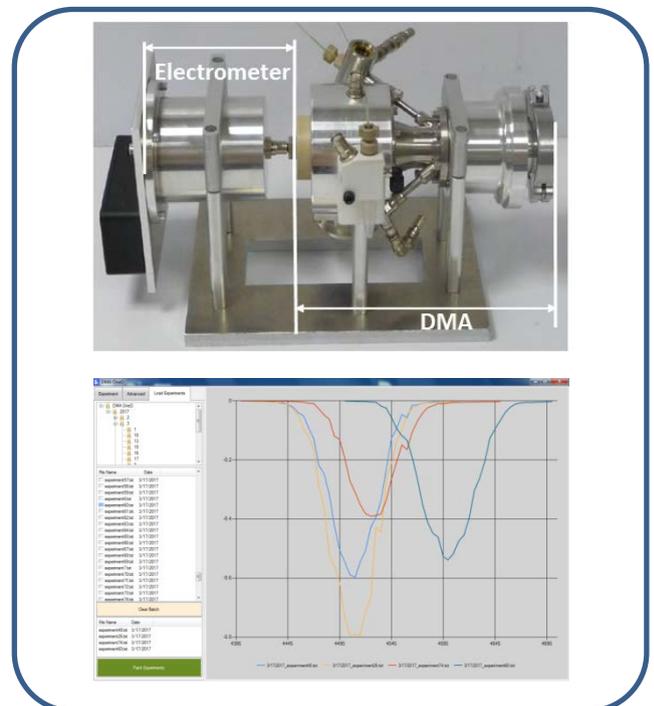
- + **Environmental**/pollution research
- + **Atmospheric**/climate research (Kangasluoma, 2014)
- + **Nucleation** and reaction **kinetics** studies (Wang, 2015)
- + **Combustion** studies (Carbone, 2016)
- + **Synthesis** of nano-particles via gas or wet techniques (Wang, 2014 and 2015).
- + **Nano-materials** development (Wang, 2014)
- + Nano-particles applications (**medical** imaging, drug delivery, catalysis)
- + Generation of **particle standards** (Attoui, 2013)

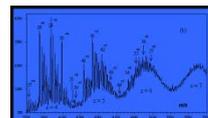


Size distributions of T.H. Ammonium Bromide (THAB) ions obtained with **Half Mini** and Nano-DMA in an independent study (Wang et Al, see Ref. 2014). Note the higher resolution of Half Mini enabling to identify all ions present in the sample.



Mobility spectra of the THA+ monomer measured with the **Half Mini** and with Nano DMA. The resolution, defined as the ratio Full Range/FWHM is almost three times bigger for the Half mini





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Kangasluoma J., Kuang C., Wimmer D., Rissanen M.P., Lehtipalo K., Ehn M., Worsnop D.R., Wang J., Kulmala M., Petäjä, [“Sub-3nm particle size and composition dependent response of a nano-CPC battery”](#) Atmospheric Measurement Techniques, (2014) 7, 689–700.

Wang Y., Jiayi F., Attoui M., Chadha T.S., Wang W.H. , Biswas P. [“Application of Half Mini DMA for sub 2 nm particle size distribution measurement in an electrospray and a flame aerosol reactor”](#), Journal of Aerosol Science (2014) 71, 52–64

Wang Y., Liu P., Fang J., Wang W.N., Biswas P., [“Kinetics of sub-2 nm TiO₂ particle formation in an aerosol reactor during thermal decomposition of titanium tetraisopropoxide”](#). Journal of Nanoparticle Research March (2015), 17:147.

Specifications

Ionization methods: secondary electrospray ionization (gas samples); nano-ESI for liquid samples

DMA type: cylindrical

Particle size range: 1 -30 nm (*)

Resolution: 30 at 2 nm, (peak voltage)/FWMH.

Operational time: 5 minutes (for start up)
≈2 seconds 1D spectra analysis

Sheath flow rate: 30-700 lpm

Clean gas supply for sample gas: 0.2-10 Lpm.

Power supply: 0-5000 V (incl. voltage control unit)

Cylindrical DMA dimensions: 220 (length) x 105 (diameter) x 135 (width)

Weight: 3.2 Kg (only the cylindrical DMA)

* For the **Half Mini (m)-model**, the resolving power in the 20-30 nm size is less than the Knutsen-Whitby limit due to non-ideal behavior at the small required sheath gas flow rates. For operation in the 20-30 nm size range the new **Half-mini (p)** model offers considerably better resolution [Fernandez de la Mora, J Aer Sci Tec, 2016]

Related products



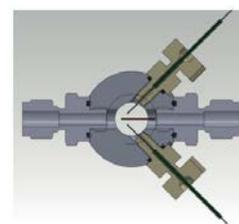
[Cylindrical DMA cell](#)



[DMA P5 SYSTEM](#)



[Faraday cage electrometer](#)



[Bipolar Chamber](#)

Developed in collaboration with
Juan Fernandez de la Mora
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