MANEUVERING MATTER ON A MOLECULAR SCALE

NanoEngineering Corporation
2234 N Federal Hwy # 481
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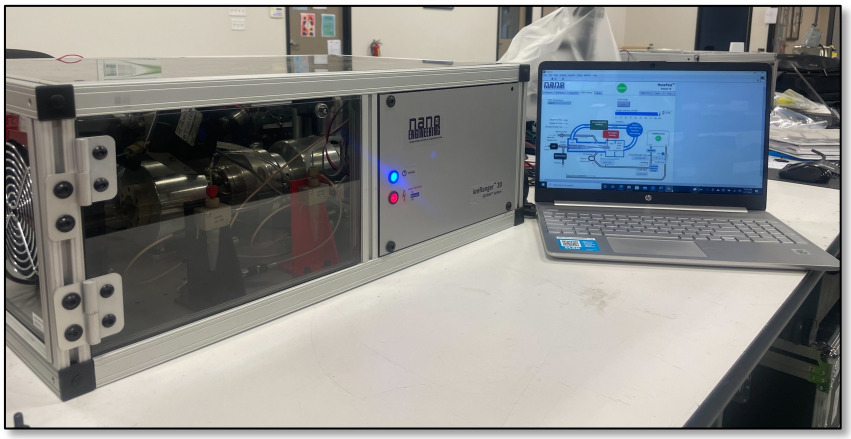
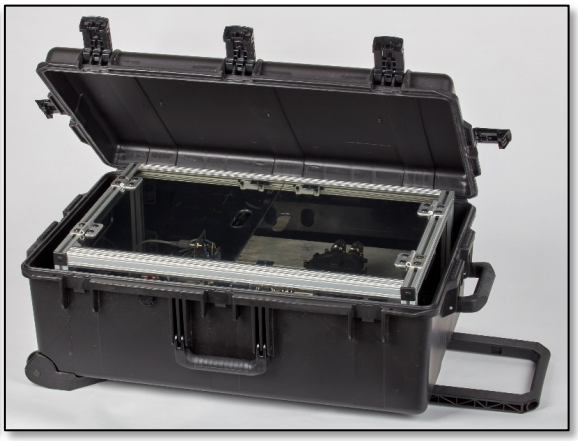
IONRANGER™ ES-DMA VERSION 0.5
Specifications

IonRanger™ is a high resolution, transportable and programmable Electro-spray Differential Mobility Analyzer (ES-DMA) system designed for research in instrumentation, particle detection, environmental studies and proteomics. IonRanger is optimized for high resolution characterization of particles with mobility size of 1-20 nm, with demonstrated capability to distinguish between particles in this range differing by 3% or less. The system comes with a choice of electro-spray emitters to address a variety of applications. IonRanger™ v0.5 features three separate inputs (Eppendorf vial, capillary*, and external air), is compatible with multiple particle detectors (CPC, Electrometer) and pairs with mass spectrometers ("ES-DMA-MS"). IonRanger™ is 100% computer controlled with industry leading test algorithms and digital camera-assisted electro-spray tuning.



IonRanger Front View with Laptop Control S/W



IonRanger in Pelican Transport Case

IonRanger v0.5 features the "Half-Mini" DMA. The Half-Mini incorporates patented technology and designs developed by Prof. Juan Fernandez de la Mora of Yale University, with demonstrated industry-leading resolution (FWHM) in its particle size range. IonRanger also features the industry's highest DMA voltage range (-10KV to +10KV).

IonRanger v0.5 is offered in three electro-spray configurations depending on researchers' needs for liquid sample handling:

IonRanger v0.5D	IonRanger v0.5M	IonRanger v0.5N
Duo-pole Electro-spray	**Mono-pole Electro-spray**	**No Electro-spray nor liquid sample input**
Ionizes and neutralizes liquid samples[1]	Ionizes liquid samples	Externally ionized air samples and/or external electro-spray
Ideal for >20 nm particles	Best for <20nm particles that do not benefit materially from neutralization	Best for testing air samples when no calibration of liquid samples is required

[1] Our patented Duo-pole electro-spray neutralization method features a second electro-spray emitting negative ions. Neutralization increases the proportion of +1 charged particles for better resolution. Our Duo-pole electrospray is high yield, easy to handle, and gentle for biological samples. It replaces other neutralizers such as radioisotopes and soft x-ray.

*Denotes new for v0.5

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Commercial	
Availability	Fall 2022
Order lead time	90-120 days
List price	Quote available upon request
Software included	Electro-spray Ionization Process Closed Loop Control High Resolution DMA Spectrum collection and recording

General	
External dimensions	L= 66 cm; W= 46 cm; H= 25.4 cm.
Weight	23 kg
Power	AC Input Range 80~264Vac, usage ~ 120 watts
Control interface	USB-3 connection to PC running Windows 10.0 or later
Bio-Safety	Total airtight sample containment
Electrical Safety	Safety door high voltage interlocks
Regulatory	Research Use Only. Not FDA approved

Sample Inputs	
Vials	Standard 0.5 mL screw-top microcentrifuge vials
External capillary*	Accommodates 0.360 mm OD capillaries
External air	6.35 mm OD tube compression fitting with ¼ turn manual valve[2]

ES-DMA Measurement Process Controls - programmable closed loop	
+/- ES vial air-over-liquid pressure	0-350 mB
+/- ES vials Pt electrode voltage	0-2 kV DC
ES sample air flow	0-5 SLM
DMA air flow (recirculated)	0-220 SLM
DMA voltage	+10 KV to -10KV*
Detector air flow	0-5 SLM (controllable to support CPC operation)
Real time Imaging of Taylor cones	10 M-Pixel monochrome digital camera Images appear in Software's Graphical User Interface

[2] Requires external ionizer such as corona discharge, radioisotope, or soft x-ray.

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Compatible External Detectors [3]	
Condensation Particle Counter	Aerosol Dynamics Model 9001* Kanomax FCPC 3650* Any other CPC with BNC pulse out port
Electrometer	Amperical Instruments 1 TOhm TSI Model 3068B*

Software features	
Real-time controls	Sample and neutralizer vial pressure Sample and neutralizer voltage ES air flow DMA air flow Detector air flow Digital camera viewing screen and frames/sec (for Taylor cones)
Programmable testing*	All real-time controls, plus: • Unlimited separate spectra per sample • Programmable across full range of all voltages and airflows* • 1 V minimum DMA voltage step • 1 V minimum Sample voltage step • 0.1 SLM minimum ES (sample) airflow step • 0.1 SLM minimum DMA (sheath) airflow step • 1 millisecond minimum dwell time.
Digital data captured	Date/Time Sequence # DMA voltage DMA air flow Detector particle count Electro-spray settings* Room temperature* Relative humidity* Ambient pressure* Operator name*

[3] Inquire about other detector options.

*Denotes new for v0.5