NanoParticle Extractor (Model 9410-00) Specifications

Particle droplet diameter: <1.0 micrometer (nominally 0.2 micrometer)
Droplet dN/dLogDp > 10 µm: <Peak dN/dLogDp × 10^{-5}
Inspection volume rate: 2-3 µL/min
Total liquid flow rate (online): 50-200 mL/min
Nebulizer flow rate (direct): 0.5-3.0 mL/min
Aerosol flow rate: 1.0 – 1.5 L/min
Response time to concentration change: <90 seconds
Inlet water pressure (online): 200-500 kPa (29 – 72 psig)
Compressed air flow rate/pressure: 3 std L/min CDA or Nitrogen, (345-414 kPa, 50-60 psi)
Wetted surface materials: PFA Teflon, PTFE, sapphire, 316L stainless steel, PEEK
Ambient temperature range: 15-35°C (59-95°F)
Ambient relative humidity range: 0-85%
Maximum water temperature: 60°C (176°F)
Dimensions (W × D × H): 23 mm (9 in.) × 23 mm (9 in.) × 35.5 mm (14 in.) (46 in. (18 in.) with fittings)
Weight: 6 Kg (13.2 lbs)
Power: Universal 100-240 VAC, 50/60 Hz, 90 W max
Output: RJ-45 for Modbus, USB FlashDrive
Internal storage: Micro SD
Ultrapure water inlet: ¼ inch PFA Flaretek®
Waste outlet: ¼ inch SS Swagelok®
Compressed air inlet: ¼ inch SS Swagelok®
Detector vacuum: ¼ inch SS Swagelok® Port
Display: 3.5 inch TFT Color, touch panel

NanoParticle Collector (Model 9410-01) Specifications

Particle size range: 5 nm -2.5 µm
Collection efficiency: >95%
Aerosol concentration: Up to 10^4 partricles/cm^3
Condensing fluids: Water, distilled or cleaner
Wick material: DVPP00010 Durapore Membrane Filter (Millipore) formed into a 30 cm long (6.35 mm OD × 4.8 mm ID) roll
Inlet/Sample flow rate: 1.0 L/min
Sampled aerosol conditions: Non-corrosive, 0 – 40°C
Sequential sampling onto SEM sample platen: 5 mounting holes for SEM stubs (plus a home set up well), mounting plate made of PEEK polymer with Stainless Steel 304 bottom heating plugs. Other materials and configurations are possible.
SEM stub dimensions: Accepts round SEM stubs – 25.4 mm (1 inch) stub main diameter maximum, 3.2 mm mounting pin diameter maximum, 9 mm mounting pin length maximum
Sequential sample time: User-selectable timed-sample on each stub from 1 minute to 24 hours
Dry deposition area: Approximately 0.5 mm diam
Communications: USB communications output for sampling parameters and instrument status
Environmental operating conditions: 15 – 30°C, 10 – 95% RH
Sample inlet: 6 mm OD SS tube
Power: Universal 100 - 230 VAC 50/60 Hz, 140 W max
Dimensions (W × D × H): 305 mm (12 in.) × 255 mm (10 in.) × 500 mm (19.5 in.)
Weight: Growth Tube Unit: 6.8 kg (15 lb), Sequential SEM Collector module: 1.1 kg (2.5 lb)

Specifications subject to change without notice.

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KANOMAX
The Ultimate Measurements

Nano SpotLight™ System

Model 9410

5 nm – 2.5 µm Particle Extraction and Collection for Ultra Pure Water (UPW)

Detecting, collecting and identifying "killer" particles (<20 nm) in high-purity liquids is very challenging and time consuming. Device geometries and feature sizes will continue to press these sizes toward 5 nm in the coming years. Traditional filter-based capture techniques have both pore-size and flowrate limitations, and may take weeks for one sample. New, faster methods for efficiently collecting particles as small as 5 nm are needed.

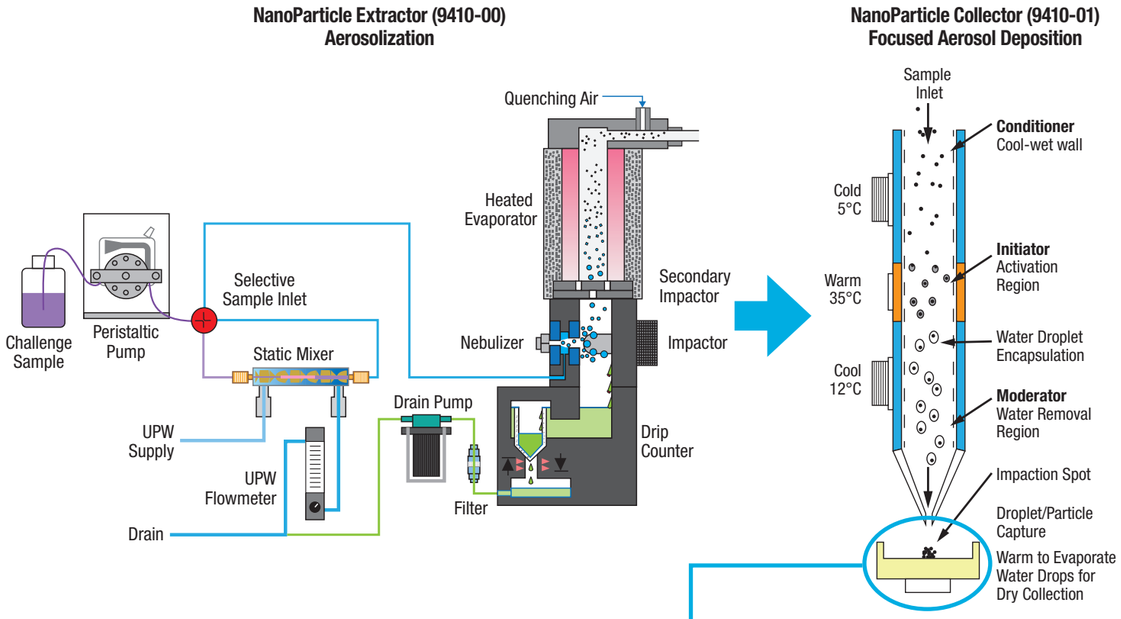
Potential Applications

- UPW system contamination mapping
- Filter retention testing
- Component contamination profiling
  - Filter (MF and UF) shedding
  - IX resin release
  - Mechanical components (valves, regulator, tubing, etc.)
  - Membrane contactors
- Particle measuring instrument to particle correlations

NanoParticle Extractor
(9410-00)

NanoParticle Collector
(9410-01)

How the Nano SpotLight™ System Works



While the semiconductor industry has been able to count nanometer sized particles for decades it has struggled to identify the elemental composition of the particles. When a "particle event" affecting semiconductor yield occurs in a semiconductor manufacturing facility, knowing the composition of the contaminating particles can be crucial in identifying the source of the event and eliminating the problem.

Traditional methods of collecting these particles for SEM or other analysis on a 25 mm filter require a long sample collection time (usually several weeks). But in situations like this speed is essential to minimize manufacturing disruption. The Nano SpotLight's typical collection time is less than 24 hours — a much better option for the industry than SEM.

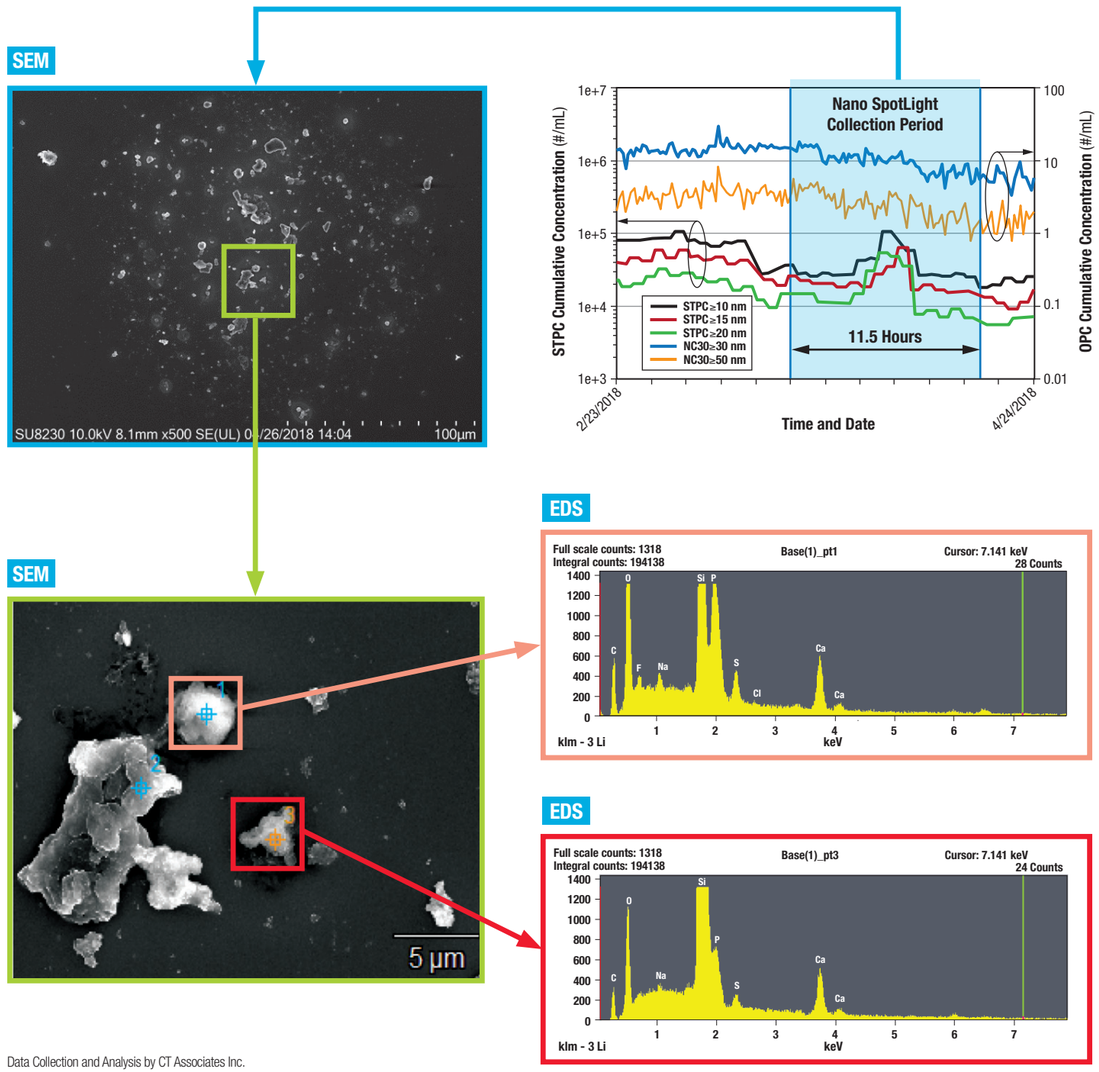
The Nano Spotlight System uses a NanoParticle Extractor to produce a droplet distribution of the UPW. Once each droplet is dried the particles, are delivered to the NanoParticle Collector for deposition onto a substrate.

The substrate is either a 1 inch diameter silicon wafer or polycarbonate membrane mounted on a SEM stub. Once the collection surface is conductive-coated the SEM technician can easily find the spot of particles in the exact center of the wafer and measure particle size as small as 5 nm.

Elemental composition of the contaminant can be determined using Energy Dispersive X-ray Spectroscopy (EDS/RDX).

Ion Exchange Resin (IX) Release Fingerprinting with the Nano SpotLight™ System

Application Example - Using the Nano SpotLight System to extract particles from the UPW after IX Resin release reveals the constituent elements. Ca, P and Na are extracted from the water by the NanoParticle Extractor, deposited on the SEM stub by the NanoParticle Collector, and analyzed by SEM/EDS. Mapping the "typical" particle release at new resin installation may be beneficial in monitoring changes in IX resin shedding characteristics and predicting IX health.



Data Collection and Analysis by CT Associates Inc.