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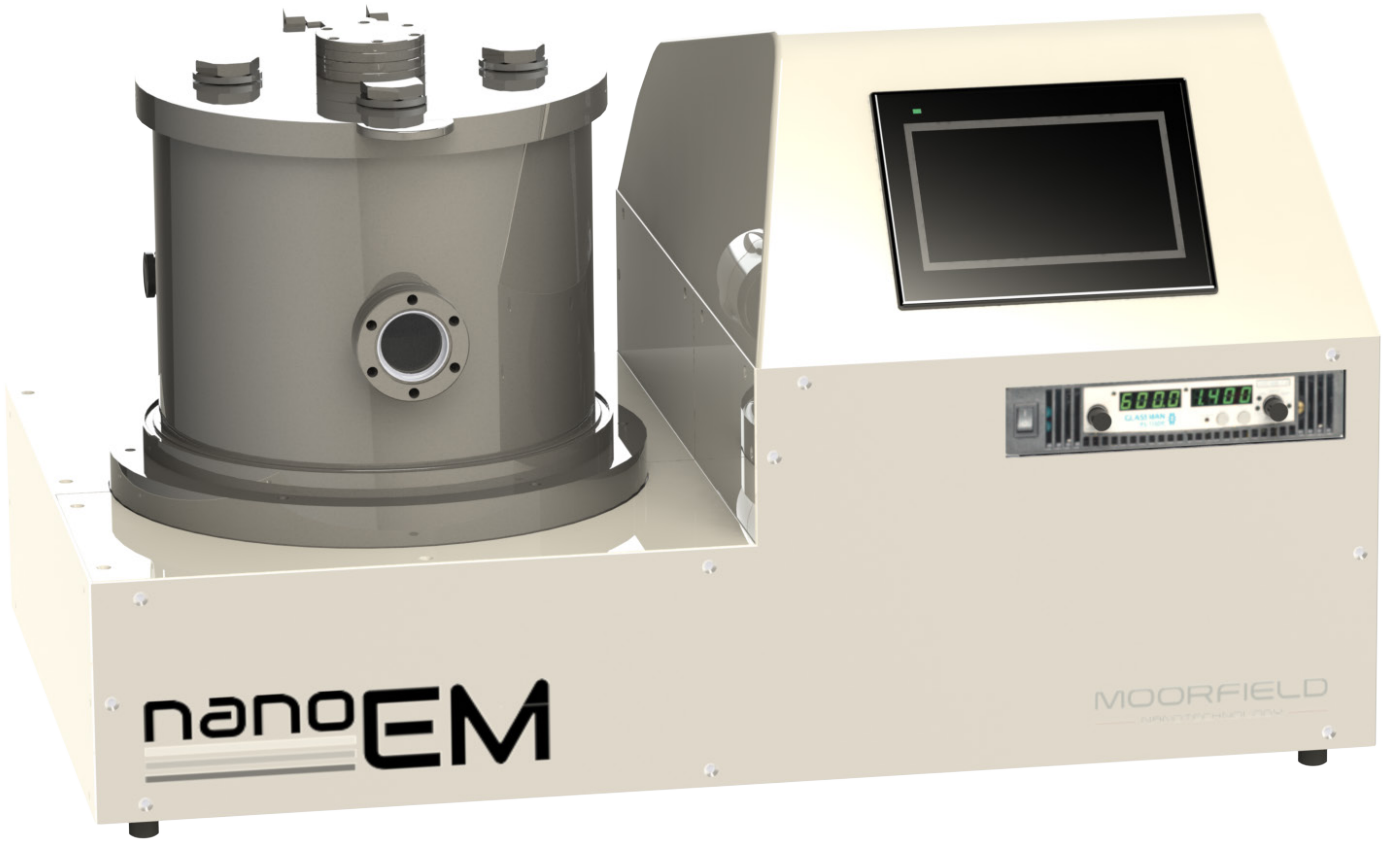
nanoEM

Compact, high-performance coating for electron microscopy applications



Key Features:

- Electron microscopy and research-grade coating
- Compact, benchtop unit
- Stub/grid/wafer substrate supports
- Up to 2 × 2″ magnetron sputtering sources
- Industry-standard sputtering targets
- Turbomolecular pumping to < 5×10^{-7} mbar
- MFC-controlled process gas
- Variable output DC power supply, up to 300 W
- Fully automatic operation via touchscreen HMI
- Automatic pressure control option
- Equipped for easy servicing
- Comprehensive safety features
- Cleanroom compatible
- Proven performance

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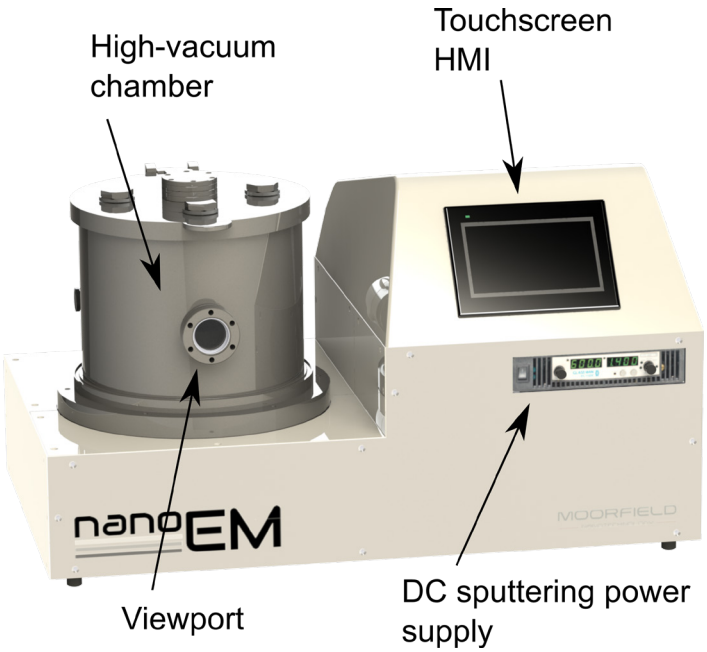
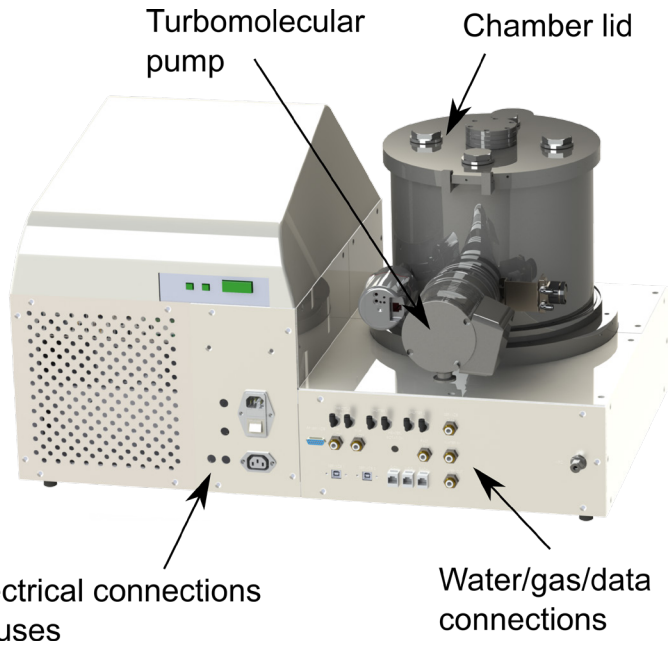
Overview:

The nanoEM system is the first electron microscopy (EM) coating tool with a full research-grade feature set. The units include stainless-steel chambers, turbomolecular pumping systems, water-cooled circular magnetrons for continuous operation and a precision sputtering power supply (DC; up to 300 W) as standard, all in a space-saving benchtop package. Ease-of-use and coating speed are built in for routine preparation of TEM/SEM samples. Using high-end components and compatibility with conventional targets, the possibilities are endless.





Technology:

The nanoEM is designed with a full feature set for routine TEM/SEM sample coating. Ease-of-use is a core principle, but the unit offers full flexibility for both routine EM coating and high-end thin film fabrication.

At the heart of the system is a modular vacuum chamber. Chamber design is per best high-vacuum principles (including a stainless steel construction). At the rear of the vacuum chamber is a port for the turbomolecular pumping system. Turbomolecular pumps provide for low base pressures $<5\times10^{-7}$ mbar, critical for minimised contamination of precious samples. Connected to the turbomolecular pump is a rotary backing pump. An optional dry pump can be supplied for cleanrooom operation.

Chamber access is via a hinged top lid, inside which is mounted the sample support stage. Numerous stages are available, including those for SEM stubs, TEM grids, or combinations of these. Stages are easy to connect/disconnect from the system allowing for fast loading/unloading in a convenient location. Also available are flat stages for holding wafer substrates with diameters up to 4".

The system can be equipped with one or two magnetron sputtering sources. Sources are water-cooled, allowing for fast or prolonged deposition, and accept standard, readily available 2" targets for research-

grade coating with minimised contamination (unlike conventional EM coating systems).

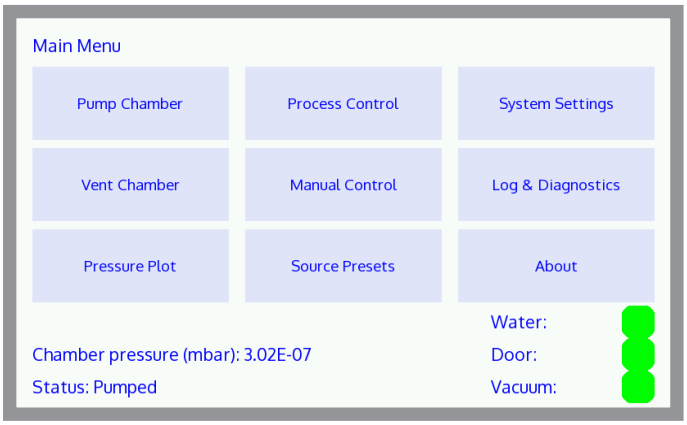
During coating, process gas (Ar) introduction is through a mass-flow controller (MFC). Also available is automatic pressure control (APC), for best process repeatability. During any gas introduction, a throttle valve shuts to low conductance in front of the turbomolecular pump, for protection of the latter. Sputtering power is from a dedicated DC power supply, for powers up to 300 W—allowing efficient use with most conductive materials. Applied power is continuously variable and advanced features such as foldback protection and full diagnostics ensure system integrity and user safety.

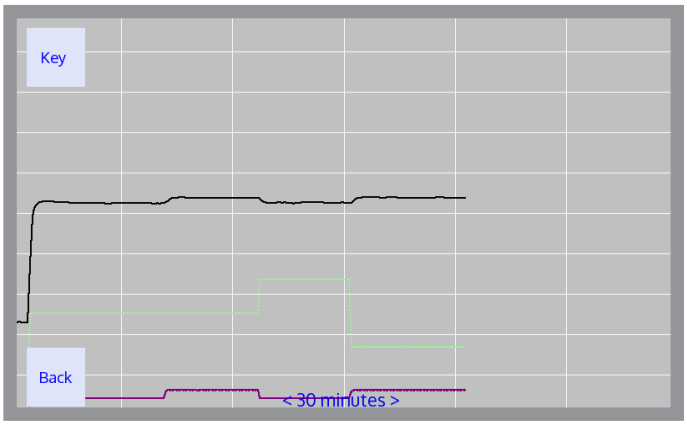
Coating rate/thickness monitoring is possible in-situ via the optional quartz crystal sensor head (with PC software).

Control System:

User operation is via a 7" touchscreen HMI mounted on the front panel. Powerful but easy-to-use software allows for system setup and operation via a menu-driven interface. Users are able to edit, save and load recipes rapidly. Recipes and live data can be recorded to a connected PC (not required). A log screen allows for usage monitoring.

Inside the unit, all hardware is controlled by industrial-grade PLC electronics. These provide highly stable operation, and also implement a full set of interlocks and other safety features for user and system protection.





Screenshots from the touchscreen HMI software through which all user operation of the nanoPVD-S10A is carried out.

Configuration and Options:

The standard configuration for the nanoEM includes one magnetron sputtering source, a turbomolecular pumping system, an MFC for Ar and a choice of sample support stages. Beyond this, a variety of options allow for flexible configuration per specific requirements:

- Dry backing pump
- Backing-pump only
- Shutter
- 2 magnetron sputtering sources
- Plasma glow module
- Fast vent module
- Rotation for sample support
- Tilt for sample support
- Automatic pressure control
- Quartz crystal monitor package
- Additional sample supports
- Re-circulating water chiller

Top-left: nanoEM chamber interior with single source, and spare ports for additional source. Top-centre: nanoEM tools have industry-standard water-cooled magnetrons for research-grade performance. Top-right: Substrate stages are connected to the chamber lid, are suitable for accepting SEM stubs, TEM grids or wafers, and are removeable for easy loading. Bottom-left: Coating as seen through the viewport. Bottom-right: The system accepts industry standard 2″ diameter sputtering targets.

System Requirements:

- Ar process gas: 25 psi supply, 99.99% purity or better
- Service gas: Dry compressed air nitrogen or argon, 60–80 psi supply
- Power: Single-phase 230 V, 50 Hz, 10 A
- Chilled water: 18–20 °C, 1 L/min, pressure < 4 bar
- Exhaust extraction

Applications:

- Sample stub coating for SEM
- TEM grid coating for TEM
- Research-grade thin film deposition
- Education
- Product R&D

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