thermo scientific

DATASHEET

WetSTEM Stage

Bringing environmental control to nanoparticle and thin sample investigations in the Environmental SEM

The second generation WetSTEM stage improves thermal control, sample handling and detection to a new level to expand application of this technology to materials science research.

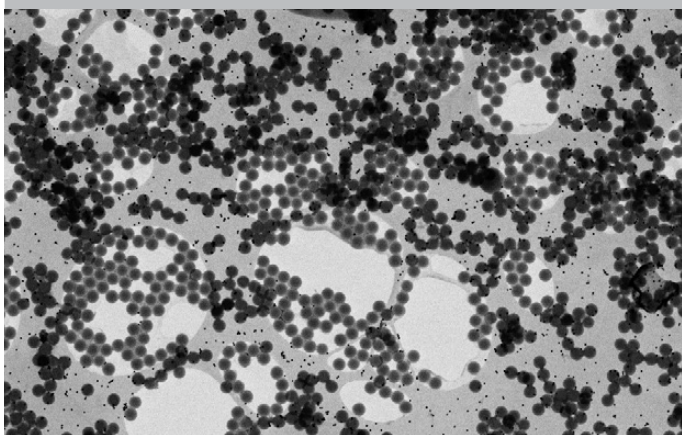
Investigation of thin and bulk materials with absorbed water is possible by setting the temperature and pressure according to the conditions needed. Observation of changes can be recorded with the Thermo Scientific™ ESEM platform movie recording feature.

Thermal management is supported for both TEM and small bulk samples, using the supplied bulk sample stubs. The Thermo Scientific WetSTEM™ stage can thus function as a traditional cold stage as well as a WetSTEM stage. TEM sample management is improved with a new clamping sample holder mechanism which makes inserting and extracting TEM grids easier.

Utilizing the annular STEM detector crystal from Thermo Scientific, the bright field collection and separation from dark field information is much improved over the first WetSTEM stage models. For WetSTEM “Retractable” stage versions the possibility to collect bright field, dark field and high-angle annular dark field information simultaneously is supported. It is possible to order WetSTEM “Fixed” stage configurations with an integrated annular STEM detector attached to the unit for systems that cannot support a retractable STEM mechanism due to port allocations, software restrictions and detector infrastructure differences. The “Fixed” version is also compatible with older ESEM systems.

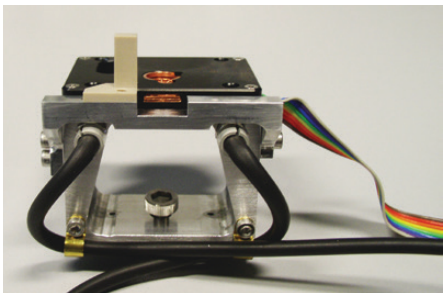
The WetSTEM stage provides a solution for investigation of both thin TEM and small bulk samples environmental control, providing cooling and some heating during observation and analysis.

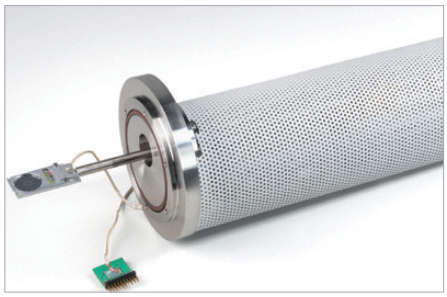
Key benefits
Supports easy sample exchange
Allows control of sample hydration
Maintains stable temperature with software controlled thermal cycling
Collects BF/DF or BF/DF/HAADF and ESEM secondary images, correlated perfectly from simultaneous acquisition
Versatile: can be used as a cold stage for bulk samples

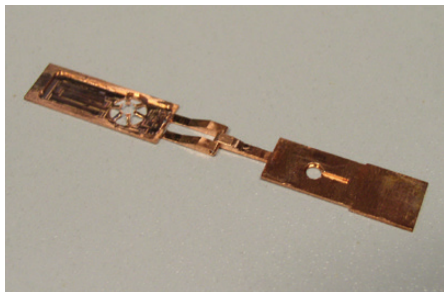


ThermoFisher SCIENTIFIC

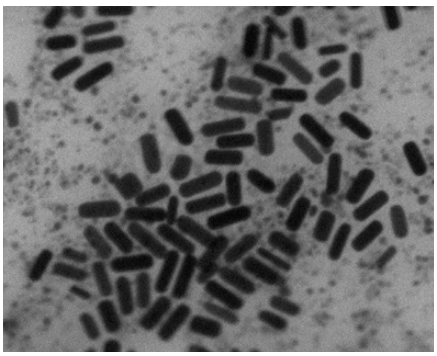
thermo scientific

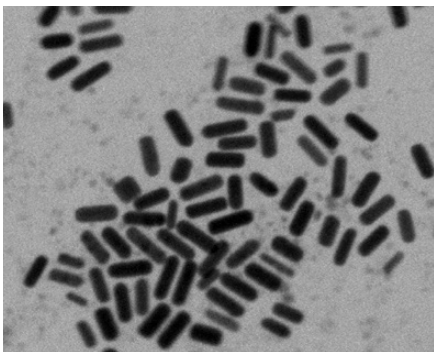


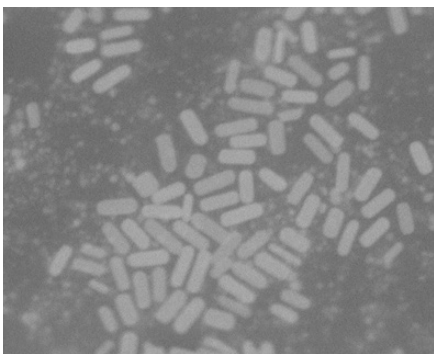




The WetSTEM module (left) mounts easily to the stage and can incorporate a fixed STEM detector or be used with a retractible STEM detector (middle). Sample holder (right) is a clamp design for ease of mounting and removing 3 mm TEM sample.







WetSTEM stage images of gold nanorods with diameter of 22 nm and length of 70 nm observed at 80% humidity.

Software and control

- Standard Thermo Scientific temperature control software on ESEM systems allows setting static or dynamic sample temperature with a specified ramp over time
- Can be used in ESEM vacuum mode to cool or warm specimens
- Can be used with approved gas environments supported by the ESEM

Detectors

- WetSTEM stages supporting either integrated or retractable detector versions aew available
- High resolution STEM with BF/DF or BF/DF/HAADF segments are supported

Technical sample specifications

- Temperature range from -20 to +60°C is achievable
- Support for 3 mm TEM grids is provided with a dedicated grid holder
- Bulk sample holders (included) support larger and thicker samples for temperature management

Installation requirements

- All configurations require Hot/Cold temperature control kit including small water chiller and chamber feedthrough
- HAADF segment control requires 6 channel detector preamplifier and compatible software
- Thermo Scientific ESEM systems can utilize the WetSTEM “Fixed” stage or in some cases WetSTEM “Retractable” stage with annular STEM detector versions depending on thesoftware and system type
- Systems with 2 channel amplifiers can accommodate the integrated detector version with BF and DF only (HAADF segments may be combined with DF signal in this configuration)

Find out more at **thermofisher.com/EM-Sales**

ThermoFisher SCIENTIFIC