

QCrÿo

Quorum

CryoEM



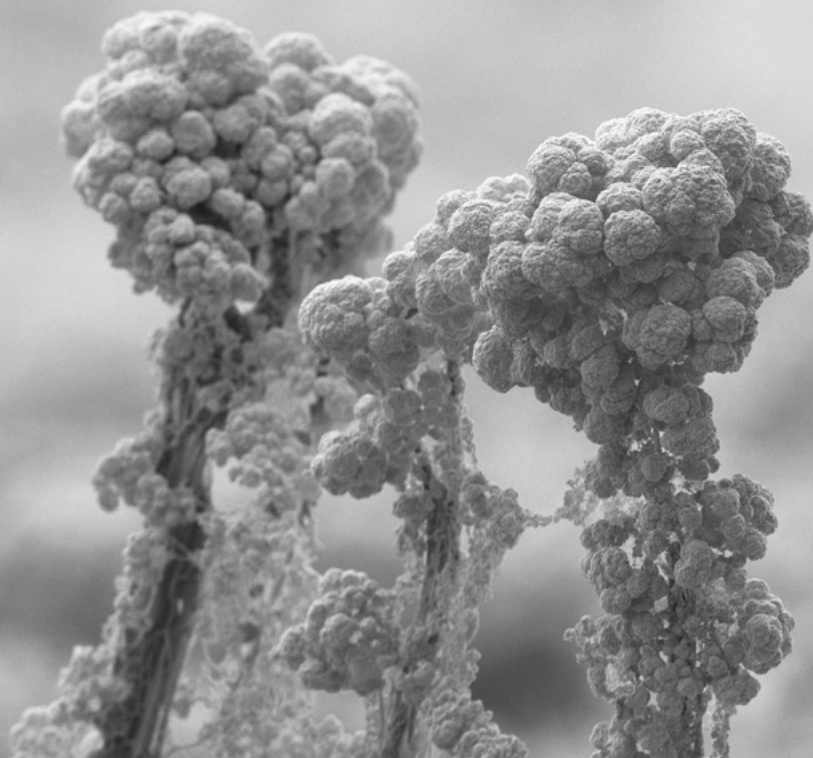
Cryo-SEM and Cryo FIB-SEM Sample Preparation Systems Portfolio

10 µm

Bellis Perennis

SPECIALISTS IN ELECTRON MICROSCOPY SAMPLE PREPARATION

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With over 40 years of expertise in electron microscopy sample preparation, we are proud to support leading institutions worldwide in pioneering scientific discovery and technological advancement.

At Quorum, we recognise that our customers' scientific applications are the driving force behind everything we do. Whether it's enabling protein research in diseases such as Alzheimer's, advancing ion conductivity for energy materials, or supporting the characterisation of nanostructured surfaces, our mission is to facilitate and enhance your research workflows with precision and reliability.

We believe that every product we develop begins and ends with the application in mind. This principle underpins our entire approach - from design and engineering to deployment and long-term support.

Our commitment is to ensure that the scientific purpose of each instrument is reflected in its functionality, operational integrity, and ease of implementation. We work collaboratively with researchers to understand the nuances of their work, ensuring our solutions align not only with technical specifications but also with the broader scientific objectives they aim to achieve.

Why Choose Quorum for Cryo Solutions

The Quorum Team is with you every step of the way - from initial enquiry to purchase and ongoing aftercare. We're committed to helping you select the most suitable products tailored to your individual application needs, working in partnership with our customers.

Our Team has extensive experience in electron microscopy sample preparation and can provide the highest quality support and guidance including:

- ◆ Detailed consultation with customers to define requirements and tailor solutions.
- ◆ Comprehensive applications and technical support, both before and after installation.
- ◆ Close collaboration with leading microscope manufacturers to guarantee compatibility.
- ◆ Commitment to high standards of quality, from installation to reliable aftercare.
- ◆ Thorough training during installation, with ongoing support to enable ease of use.



Cryo-EM Sample Preparation

Cryo-Electron Microscopy (Cryo-EM) has transformed the imaging and analysis of high-moisture, beam-sensitive and environmentally sensitive samples. By maintaining the structural integrity of samples, Cryo-EM allows researchers to examine biological and material specimens in their near-native state delivering highly accurate and detailed results.

Unlike conventional methods such as freeze-drying or chemical fixation, which often compromise sample structure, modern cryo techniques preserve delicate features while mitigating against sample damage.

Quorum's market-leading range of cryo sample preparation solutions are engineered to support advanced workflow, offering precision, reliability, and ease of use to ensure optimal results.

Benefits of Cryo Sample Preparation

- ✦ Maintains the structural integrity of delicate samples to ensure imaging and analysis of specimens in their near-native state.
- ✦ Eliminates the damage introduced through conventional dehydration methods such as chemical fixation, freeze drying and critical point drying.
- ✦ Allows observation of dynamic processes by freezing of samples at regular intervals, allowing for time-lapsed imaging.
- ✦ Minimises beam damage on beam-sensitive samples such as hydrogels, delicate biological specimens and lithium-ion batteries.
- ✦ On-column cryo sample preparation chamber reduces exposure of specimens to contamination, providing a seamless transition from freezing to EM analysis.
- ✦ Versatile across a wide range of workflows, with compatibility extending to numerous applications.

Cryo Workflows

Life Sciences

- ✦ Cryo-FIB Milling
- ✦ Cryo-SEM Imaging and Analysis
- ✦ Cryo FIB-SEM Volume Imaging
- ✦ Cryo-CLEM
- ✦ Cryo TEM Lamella Preparation
- ✦ Cryo Lift-out

Material Sciences

- ✦ Cryo-FIB
- ✦ Beam sensitive samples
- ✦ Air sensitive samples

The PP3010 Cryo Sample Preparation System is compatible with most makes and models of SEM and FIB-SEM. Its off-column, gas-cooled design enables rapid thermal response, while the sample preparation chamber provides excellent visibility. The PP3010 streamlines workflows by allowing users to plunge freeze, fracture, sublimate, and coat samples - all within a single, user-friendly system supporting the observation and analysis of specimens in their near-native state.

CryoEM

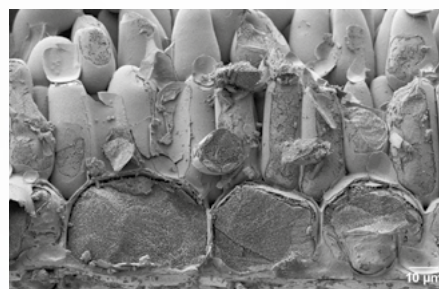
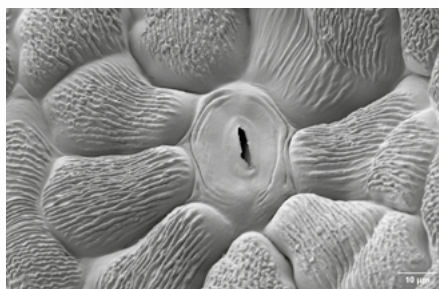
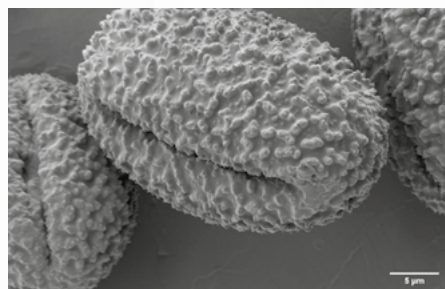
PP3010

Cryo Preparation System



Typical applications

- ◆ Material Science such as Lithium battery and Semiconductors
- ◆ Biological and Life Sciences
- ◆ Food Science
- ◆ Earth and Planetary Science
- ◆ Characterisation of samples with high moisture content including Hydrogels, Oleogels and Bi-gels
- ◆ Beauty and Cosmetics Research
- ◆ Characterisation of pre-frozen samples



Samples prepared using the PP3010 Cryo Preparation System, each sample sputtered with 10 nm Pt prior to imaging. A: Fractured leaf sample, mag = 495 X. B: Leaf surface, mag = 1.00 KX. C: Carrot mould sample, mag = 5.00 KX. D: Pollen on leaf surface, mag = 2.50 KX. Courtesy of Nanoscale and Microscale Research Centre (nmRC), University of Nottingham, Dr. Christopher DJ Parmenter, FRMS and Nicola Weston.

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PP3010

Product Features

- ◆ The PP3010 Cryo Preparation System can be used as part of a workflow solution for maintaining lamella preparation and reverse vitreous transfer
- ◆ Gas-cooled for rapid thermal response
- ◆ Easy transfer between prep chamber and host instrument
- ◆ Ability to transfer vitreous frozen samples under vacuum
- ◆ Remote dewar for gas cooling
- ◆ Clear visibility of chamber
- ◆ Controlled automatic sublimation
- ◆ Automated sputter coating
- ◆ Turbo-molecular pumped cryo preparation chamber

Specifications

SEM Cold Stage:

- ◆ Nitrogen gas cooled cold stage, operating temperature, ambient to -190 °C
- ◆ Temperature stability: + /- 0.5 °C

Column mounted Cryo preparation chamber with:

- ◆ Nitrogen gas cooled cold stage and anti-contaminator operating temperature, ambient to -190 °C
- ◆ Temperature stability: + /- 0.5 °C
- ◆ Multiple LED illumination and CCD camera
- ◆ Actively cooled fracturing tool
- ◆ Large front window (150 mm x 76 mm) plus two top viewing ports
- ◆ Automated, fine grain sputtering with Platinum (Pt) standard target
- ◆ Automated sublimation

Cryo Heat Exchange:

- ◆ Off-column Cryo Heat Exchanger (CHE) when used with 30 litre LN₂ dewar allows for maximum 24-hour operation (two gas lines) of the SEM stage (- 140 °C) and SEM anti-contaminator (- 175 °C)

Preparation Chamber Pumping System:

- ◆ Floor-mounted turbo pumping with flexible stainless steel vacuum connection to the preparation chamber
- ◆ Base vacuum:
 - Ambient: 8×10^{-5} mbar
 - Cold: 8×10^{-7} mbar
 - Single 5 m³/hr or equivalent vacuum pump required

Prep-dek® Sample Preparation Station

- ◆ Slushed nitrogen freezing and sample handling system
- ◆ Compatible for handling pre-frozen samples
- ◆ Includes work area for sample preparation
- ◆ Flexible LED lighting
- ◆ Vacuum storage for sample transfer device and sample mounting fixture

aQuilo® Software control via 15" touch-screen panel PC

- ◆ User definable sublimation and coating recipes can be stored
- ◆ Remote factory support via TeamViewer subject to internet connection
- ◆ On-screen data logging, diagnostics and support video

PP3010 Options

- ◆ Pressurised liquid nitrogen dewar
- ◆ Film Thickness Monitor (FTM)
- ◆ Carbon Fibre Evaporation Attachment
- ◆ Micrometer Controlled Knife
- ◆ TEM Prep Slusher, required for lamella preparation for TEM.
- ◆ Binocular microscope
- ◆ Specimen Stubs
- ◆ Specimen Shuttle
- ◆ Cryo Rotate Stage

Quorum Technologies products are covered under a standard 1-year warranty. Extended warranty is available upon product registration subject to eligibility. Please contact service@quorumtech.com for more information.

PP3010

Accessories

The PP3010 offers a comprehensive selection of accessories designed to optimise and enhance workflow efficiency. Developed to support a wide range of application needs, each accessory combines user-friendly functionality with precision design to meet operational requirements.

AutoRefill

The Auto Refill is an upgrade to the current Cryo Heat Exchanger (CHE) allowing customers to extend their study durations. It comprises a refill mechanism mounted directly onto the CHE, which monitors liquid nitrogen (LN₂) levels and automatically replenishes the storage dewar. Additionally, a gas drying unit connects to the rear of the Quorum Prep-dek®, delivering cooling to the stage and other system components.



Features

Run times

- ◆ 24 hour run time for two lines with 60 litre dewar
- ◆ 48 hour run time for three lines with 120 litre dewar
- ◆ Operation in configuration with the PP3010 Cryo Preparation System

Conditions

- ◆ Operating temperature: room temperature 20 °C
- ◆ Operating humidity: Less than 50%

RotateStage

Offering bi-directional 360° rotation controlled by the microscope software, the Cryo Rotate Stage allows for easy navigation to areas of interest and minimizes the radiation damage to beam sensitive samples.



Features

- ◆ Ideal for focused ion beam (FIB) milling and SEM imaging/analysis
- ◆ Cryogenic temperatures down to -160 °C
- ◆ Temperature controlled by The PP3010 Cryo Preparation System

PP3010

ACT

The Actively Cooled Transfer (ACT) is specifically designed for transferring delicate samples under both cryogenic conditions & high vacuum or at ambient temperatures under inert atmosphere. Its unique features include a built-in cold stage and an anti-contaminator, ensuring that sample integrity is maintained during the transfer process. The ACT is equipped with a solid Magdrive transfer rod and an attached cooling dewar, offering a highly accessible and portable solution for your needs.

Features

- ❖ Compatible with most makes and models of SEM and FIB-SEM
- ❖ Can be interfaced with other devices, such as Ion Mills
- ❖ Cold stage cooled to -160 °C
- ❖ Anti-contaminator cooled to -180 °C
- ❖ Glovebox interfacing required for inert gas transfer
- ❖ Transferring materials sensitive to atmosphere, such as Battery and Fuel Cells
- ❖ Operates in conjunction with the PP3010 and PP3006
- ❖ Transfer in high vacuum in the region of 10^{-6} mbar



TEMPrep Slusher

The TEM Prep Slusher accepts pre-frozen samples from third party products e.g. plunge freeze, high pressure freezer, cryo microtome. Designed for user-friendly operation and versatile functionality, it supports a wide range of application requirements.

Configuration

Operation in conjunction with the PP3010 Cryo Preparation System.

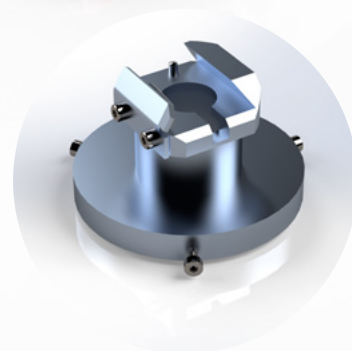
Please note, interfacing required, please contact sales@quorumtech.com for more information

QuickLok

PP3004 QuickLok

Sample transfer system for SEM, FIB-SEM, beamline and vacuum platforms

- ⇒ Rapid specimen exchange
- ⇒ Atmosphere/inert gas to vacuum transfer
- ⇒ Upgrade path to PP3006 CoolLok



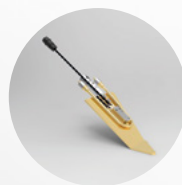
Ambient Stage

SEMCool

PP3005 SEMCool

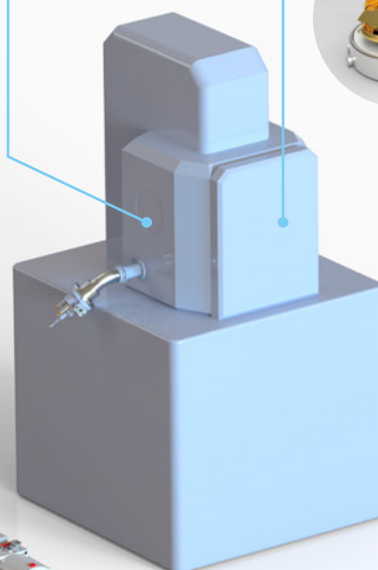
Gas cooling system for sample stage in SEM, FIB-SEM, beamline and vacuum platforms

- ⇒ Nitrogen gas cooled cold stage and anti-contaminator, ambient to -190 °C
- ⇒ Temperature stability: +/- 0.5 °C
- ⇒ Off-column cooling
- ⇒ Independent cooling of cold stage and anti-contaminator
- ⇒ Upgrade path to PP3006 CoolLok



Anti-Contaminator

Cold Stage



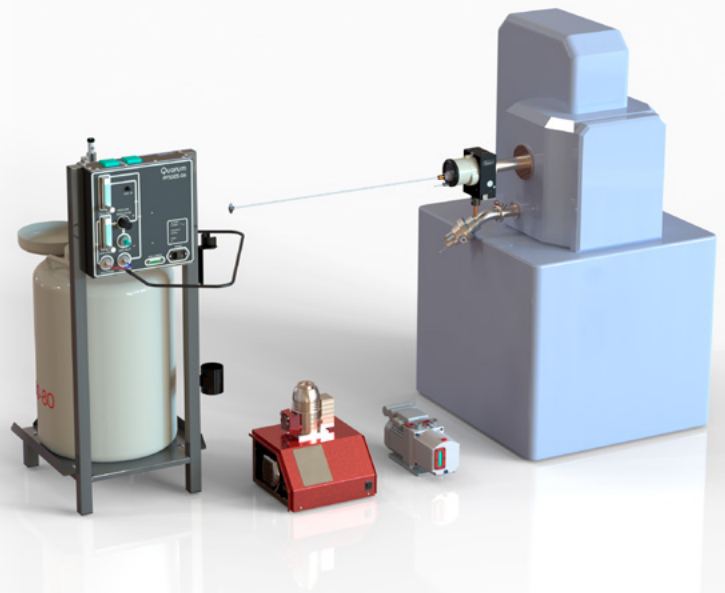
CoolLok



PP3006 CoolLok

Sample transfer and gas cooling system for SEM, FIB-SEM, beamline and vacuum platforms

- ◆ Nitrogen gas cooled cold stage and anti-contaminator, ambient to -190 °C
- ◆ Temperature stability: +/- 0.5 °C
- ◆ Off column cooling with 24 hour run times before fills
- ◆ Independent cooling of the cold stage and anti-contaminator
- ◆ Atmosphere/inert gas to vacuum transfer



PP3004 / PP3005 / PP3006 Options

- | | |
|----------------------|--|
| ◆ Glovebox Interface | ◆ Pressurised liquid nitrogen dewar |
| ◆ Specimen Shuttles | ◆ LN ₂ Slushing Station |
| ◆ Specimen Stubs | ◆ TEM Prep Slusher (Slushing Station required) |

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