

Sample Preparation

HITACHI
Inspire the Next



ZoneSEM II



ZoneTEM II



IM4000 II /
IM4000 II-CTC



ArBlade 5000 /
IM5000-CTC



UV-Ozone Sample Cleaner for SEM and TEM

Gentle removal of hydrocarbon contamination

SEM and STEM / TEM users know the problem: High-resolution imaging is often impaired (if not made completely impossible) by the rapid build-up of a carbon film in the observation area. This is usually caused by gaseous hydrocarbons that are continuously deposited during observation due to the energy transfer of the electron beam. The source of these hydrocarbons can be a non-optimal chamber vacuum, which can typically be improved with plasma cleaners with high energy input, or more gently with Hitachi's excimer light source "Sparkle".

In most cases, however, the observation objects and sample holders themselves are the dominant source of contamination. Here, plasma treatment often proves to be too rough in the sense of altering or even destroying the sample. Hitachi's ZONE cleaners for SEM and TEM offer a gentle, clever alternative based on ultraviolet light and free oxygen radicals: fast and thorough removal of interfering hydrocarbons with significantly reduced energy input compared to plasma cleaners.

The sample cleaners in the ZONE product family are equipped with UV lamps with wavelengths of 185nm and 254nm, which attack typical hydrocarbon bonds, break up oxygen molecules and generate reactive components in the form of ozone.

The integrated diaphragm pump generates an adjustable moderate vacuum between 13 and 67kPa. The chamber pressure can be used to optimise the cleaning mechanism between more oxidative or more physical depending on the type of sample.

ZoneSEM II



✓ Product Features

- For samples up to 100mm Ø and 37mm high
- Cleaning and storage function
- Recipe memory
- Typical process times 5-15 minutes

ZoneTEM II



✓ Product Features

- Access for up to 5 TEM sample holders (configurable)
- Cleaning and storage function
- Recipe memory

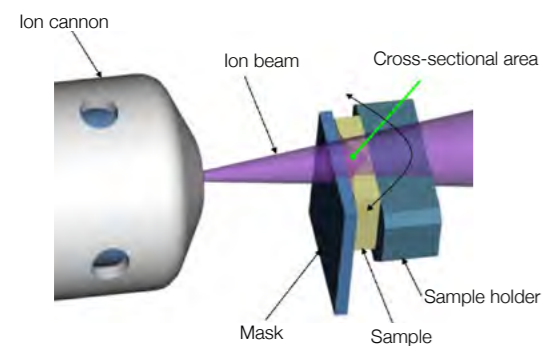
Argon ion Polishing Systems of the IM Series

The clever alternative to FIB technology

The IM series systems are indispensable for SEM sample preparation. They are ideal for when high-quality, millimetre-scale cross-sections or surfaces are needed and conventional mechanical preparation methods don't give satisfactory results.

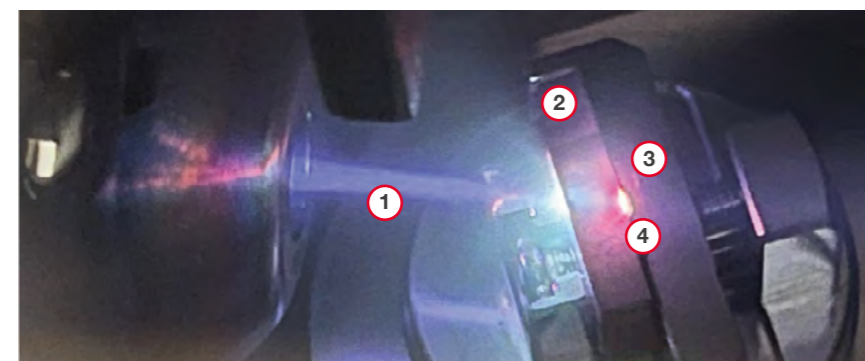
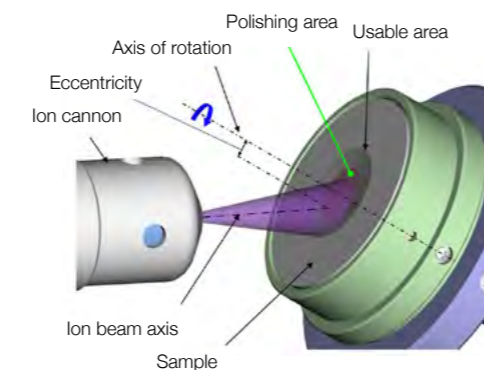
Cross-section preparation

Sharp, precisely positionable and mechanically undisturbed cross-sections in millimetre widths through almost all materials and composites. Even heat-sensitive materials such as polymers can be processed successfully, and an optional temperature-controlled cryogenic version is available if required. A sample height of up to 8mm also allows for larger workpieces.



Surface polishing (flatmilling)

Post-processing of mechanically pre-polished surfaces on samples up to 50mm in diameter and 25mm in height. By freely selecting the angle of incidence of the ion beam, various effects can be achieved, from surface smoothing and cleaning for EBSD analyses to relief generation through selective sputtering.



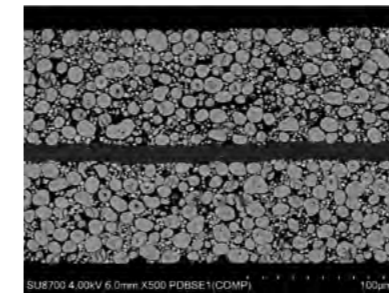
- 1 Argon ion beam
- 2 Mask
- 3 Sample stub
- 4 Sample

Insight into the ArBlade 5000 sample chamber during cross-sectioning at an NCM LiB cathode

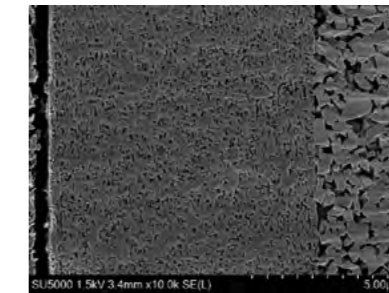
The two systems IM4000 II and ArBlade 5000 are presented on the following pages.

Application examples

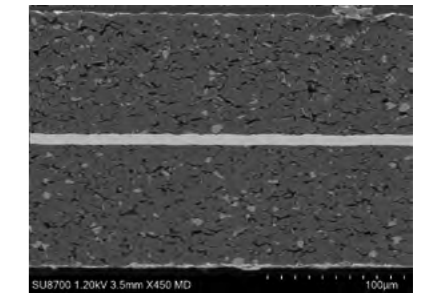
Energy systems



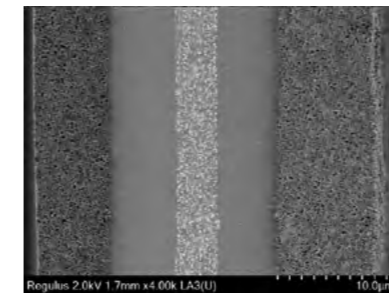
LIB NCM Cathode



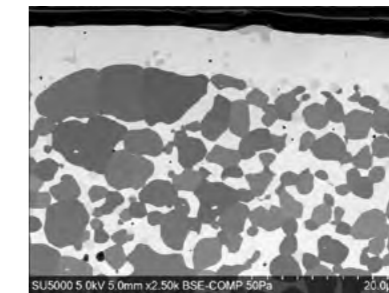
LIB separator film



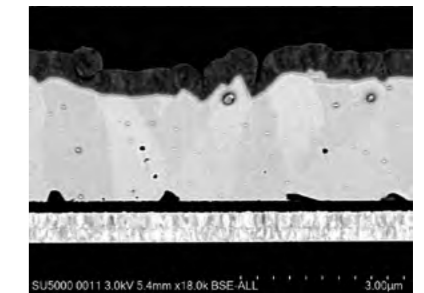
LIB Anode



Polymer fuel cell

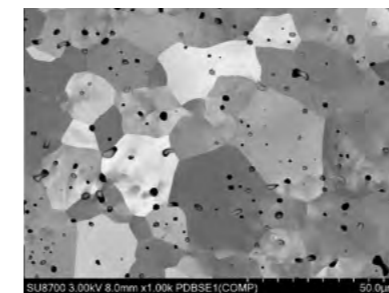


Ceramic fuel cell (La-Ce/NiO)

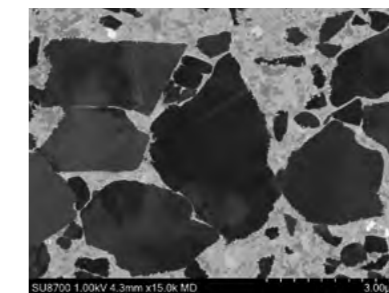


CIGS solar cell

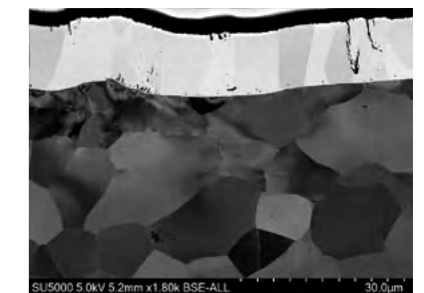
Metals



Tungsten alloy

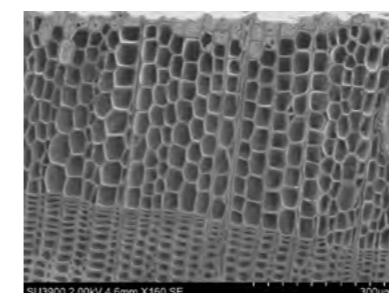


Boron nitride

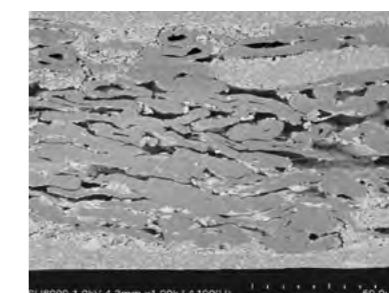


Zinc coating on steel

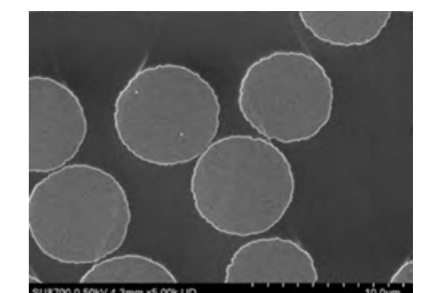
Organics



Wood

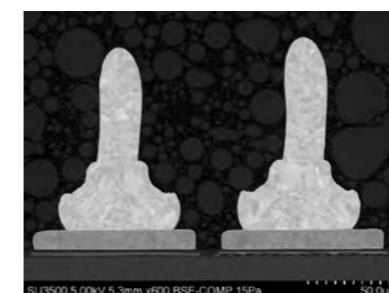


Paper

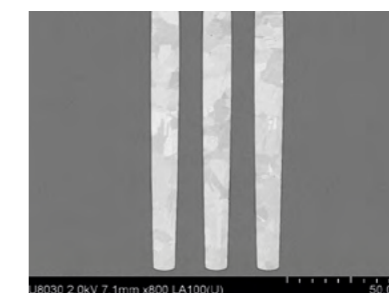


Carbon fibre reinforced plastic

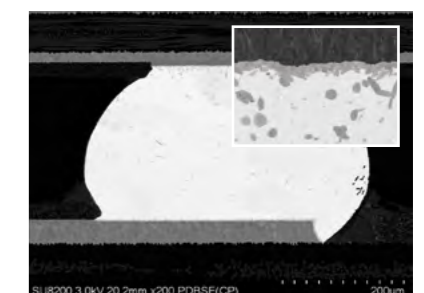
Semiconductors



Chip bonding wires



Cu TSV



Bonding ball on PCB



IM4000 II / IM4000 II-CTC

Standard Ar+ cross-section and surface polisher



IM4000 II is a modular computer-controlled argon ion polishing system that can be equipped as a pure surface polisher, as a cross-section polisher or as a hybrid system, depending on the desired functionality. With a beam energy selectable in 100eV steps from 0.1keV to 6.0keV, a wide range of applications can be covered, from the finest polishes to larger cross-sections. In cross-section operation, IM4000 II achieves a maximum removal rate in Si of 500µm/hour (6keV, protrusion over the mask edge 100µm, stage oscillation ±30°).

Functions such as auto-start/time preselection, interval polishing or two-stage processes are available. The IM4000 II-CTC offers the option of process temperatures down to -100°C in cross-section operation.

+ Optional Accessories

Flatmilling equipment for specimen up to 50mm Ø and 25mm height

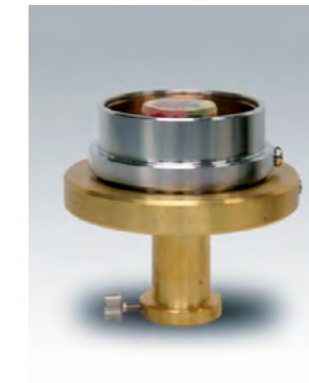
Cross-section equipment for standard samples up to 20mm wide / 12mm deep / 8mm high

Cross-section holder for large samples up to 35mm wide / 17mm deep - 8mm high

Stereo microscope (also with camera connection) for live process observation

Inert gas transfer function "air protection" for cross sections and surface polishing

Special cryo cross-section holder for extra fast and accurate cryo processes



Flatmilling-Set
Polishing of grindings up to 50mm Ø and 25mm Ø



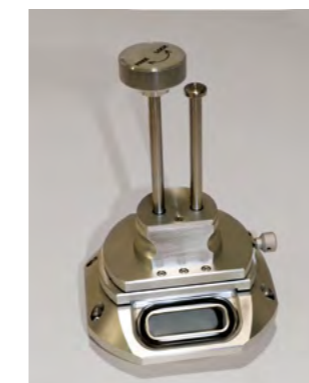
Cross-section set
Preparation of cross sections



Active cooling
Of cross-sections using liquid nitrogen



Zoom Stereo OM
For process observation in real time. As bi-ocular or additionally with C-mount camera adapter



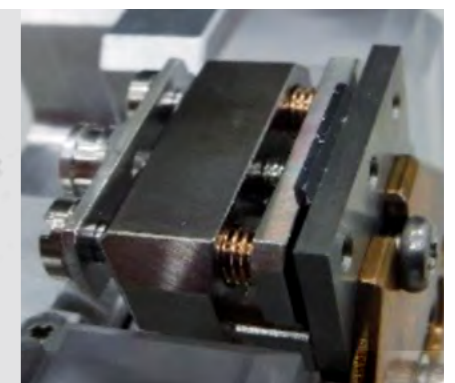
Air Protection-Set
Inert gas transfer for cross-sections and surfaces



Cross-section holder for large samples
Up to 35mm width, 17mm depth, 8mm height



Optimised cryo cross-section holder
Made of polycarbonate, samples are pressed against the cooled mask by spring force for optimum heat transfer. Only for CTC version.



✓ Product Features

Single, robust and maintenance-friendly Penning-type ion gun with independent control of beam current and acceleration voltage. Allows intensive ion beams at all acceleration voltages (0-6kV)

Cross-sectional process depth in Si with 100µm protrusion above mask, stage oscillation +/-30°, is 500µm per hour or more

Surface polishing can be carried out at tilt angles from 0° to 90°, angle can be changed during the process

Large sample chamber with a fully retractable multi-axis stage attached to the chamber door to accommodate the various application modules



ArBlade 5000 / IM5000-CTC

High-performance Ar⁺ ion polisher



+ Optional Accessories

Flatmilling equipment for specimen up to 50mm Ø and 25mm height

Multiple cross-section holders for up to 3 samples up to 15mm wide, or one sample up to 50mm wide

Advanced Control Software for extended range of functions

Inert gas transfer function "Air protection" for cross sections and surface polishing

Special cryo cross-section holder for extra fast and accurate cryo processes

✓ Product Features

Single, robust and maintenance-friendly Penningtype ion gun with independent control of beam current and acceleration voltage. Allows intensive ion beams at all acceleration voltages (0-8kV)

Cross-section widths can be flexibly selected by periodically moving the sample relative to the ion beam from 1 mm to 10 mm wide

Cross-sectional process depth in Si with 100µm protrusion above mask, stage oscillation +/-30°, is 1000µm per hour or more

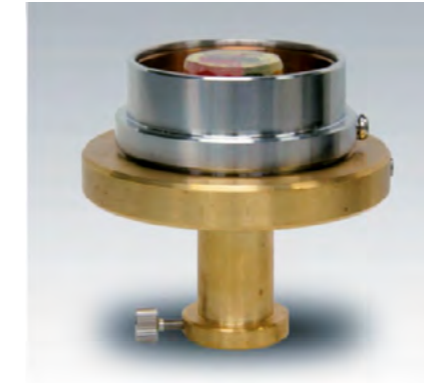
Surface polishing can be carried out at tilt angles from 0° to 90°, angle can be changed during the process

ArBlade 5000 / IM5000 extends the cross-sectioning capabilities of the IM4000 II series with the option of expanding cross-sections to a width of up to 10 mm, depending on actual requirements. For this purpose, the sample is periodically moved laterally during cross-cutting in the previously registered processing area while remaining in the optimum focus. Sequential processing of several individual positions is also possible as an option; the optional multiple sample holder allows automatic processing of up to 3 samples.

The ArBlade 5000 / IM5000 is equipped with a more powerful ion gun with a removal rate of over 1mm per hour. With the ArBlade 5000-CTC, cryo cross-sections of variable widths are also possible at definable process temperatures down to -100 °C.

Accessories (extract)

Extensions and additional functions for IM



Flat milling equipment
Enables the refinement of mechanically pre-polished sections up to 50mm Ø e.g. for EBSD analyses



Zoom Stereo OM
For process observation in real time. As bi-ocular or additionally with C-mount camera adapter



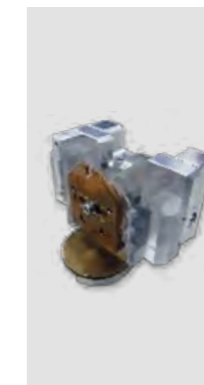
Active cooling
Of cross-sections using liquid nitrogen



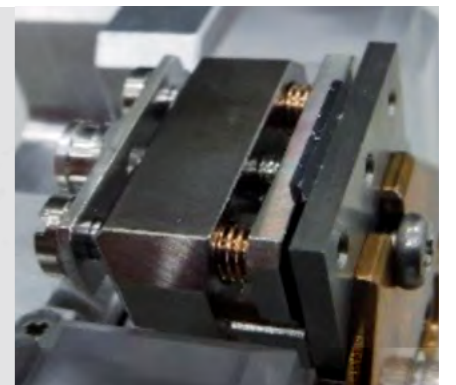
Air Protection-Set
Inert gas transfer for cross-sections and surfaces



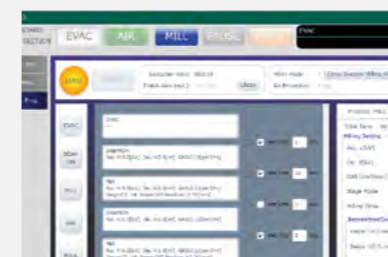
Cross-section holder for large samples
Up to 35mm width, 17mm depth, 8mm height



Optimised cryo cross-section holder
Made of polycarbonate, samples are pressed against the cooled mask by spring force for optimum heat transfer. Only for CTC version.



Exclusive ArBlade 5000 /IM5000-CTC



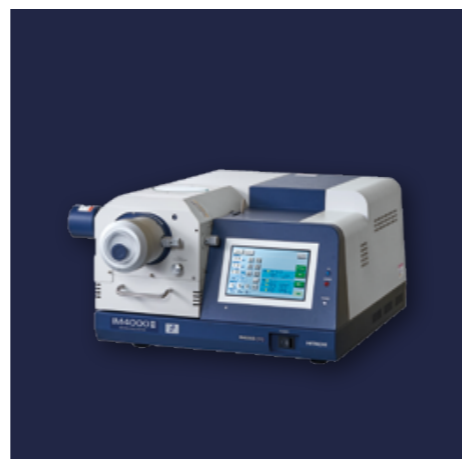
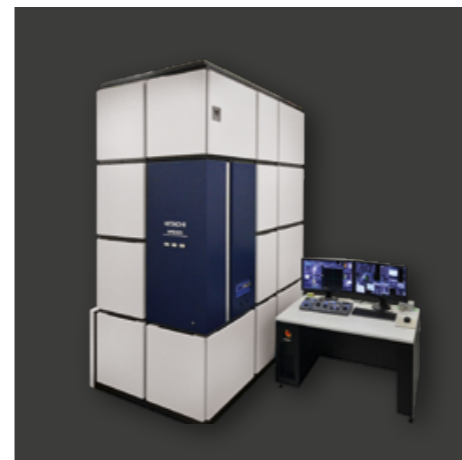
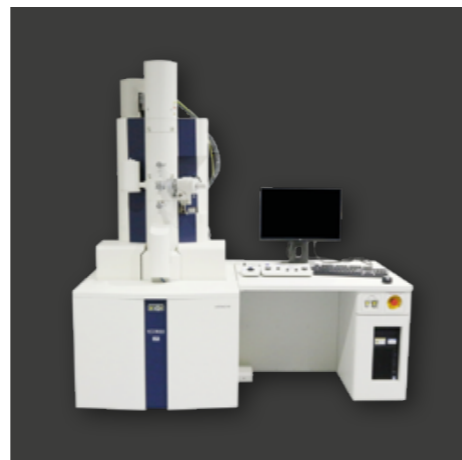
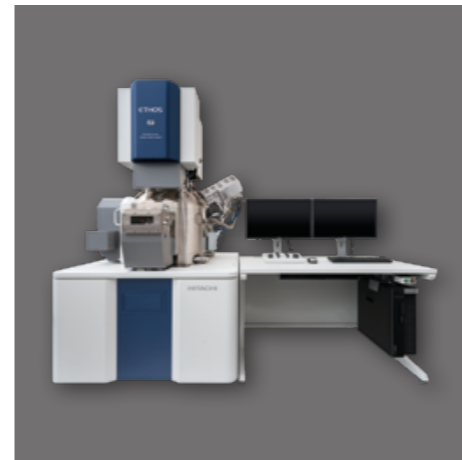
Advanced Control Software
External operating software with an extended range of functions, allowing the creation of free work sequences with several cross-section positions, for example



Multiple / Large Sample Holder
Extended traverse path of 40mm allows sequential automatic processing of several individual samples or even a single sample up to 50mm wide



Positioning Microscope for Clamp Holder
Alternative to the mechanical sample positioners for spring clamp holders (cryo and multiple cross-section holders)



Not sure which product aligns with your needs?

Our experts are here to provide guidance and help you make the best choice.



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