CP-8000
Cross Section Polisher

COXEM

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"WINDOW TO THE NANO WORLD"

CP-8000

Cross Section Polisher

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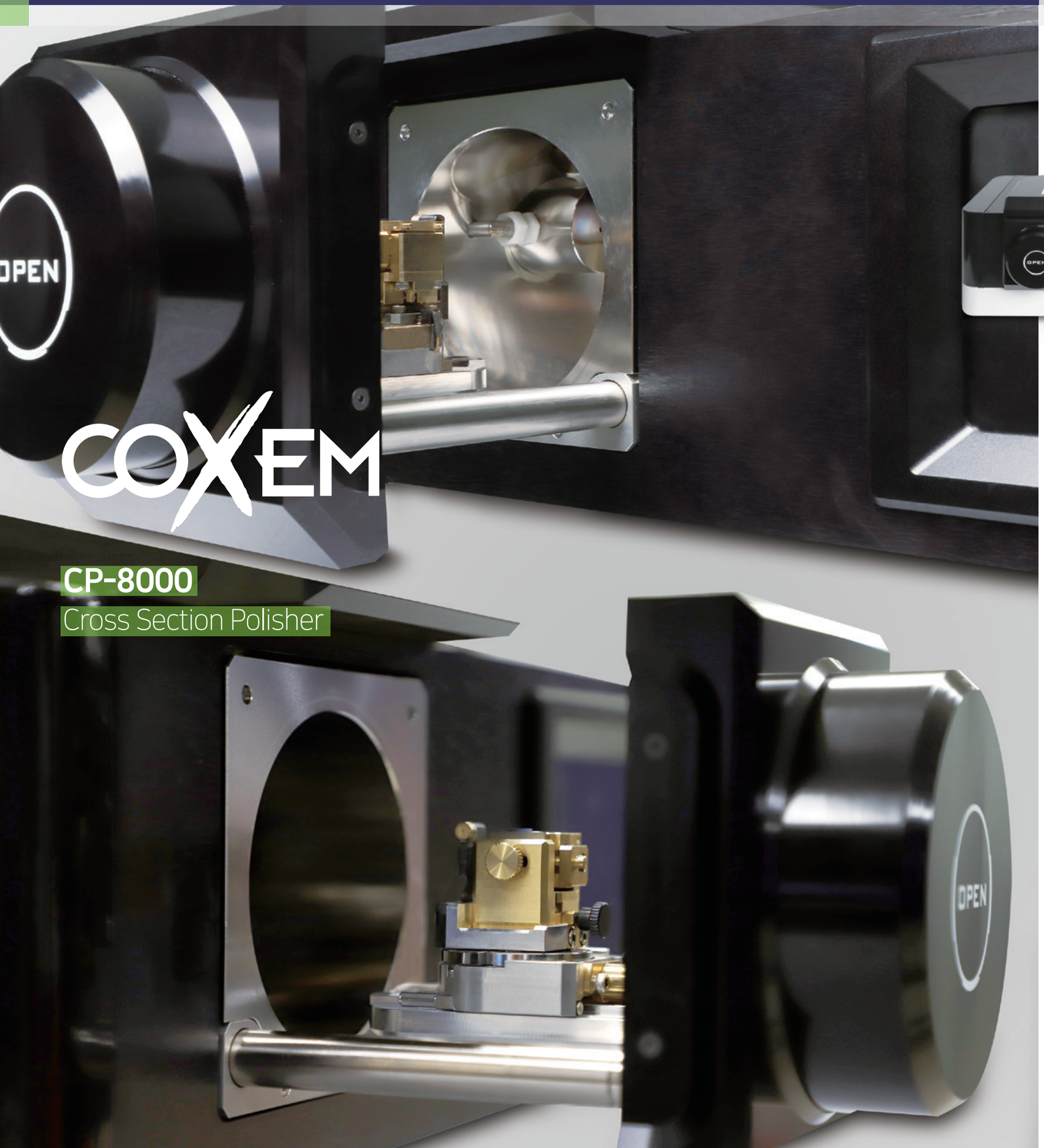


Features

Accelerating Voltage of 2kV to 8kV, Auto Beam ON/OFF Function,
Four–Level Swing Speed,
CCD Camera to Observe Polishing Process
One-Click Activation with Touch Panel Display

- The CP-8000 Cross Section Polisher is designed to make a large cross section surfaces comparable to a FIB but at much lower cost.
- No chemical etching process is required, which permits samples to be observed without damage to the surface. The use of Argon gas prevents sample from structural changes.
- It is easy to operate and less costly to run than a mechanical polisher, and it is eco-friendly as it is free of any chemical waste.
- Both soft and hard materials can be prepared with the CP-8000 by adjusting accelerating voltage.

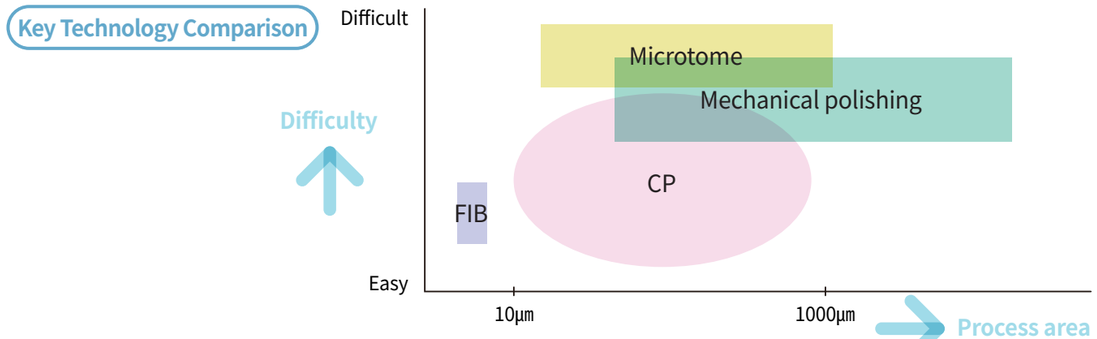
Specifications

ION GUN	PENNING TYPE ARGON ION GUN
Accelerating voltage	• 2 to 8 kV
Milling speed	• 300um/Hour at Si wafer 5kV
Maximum specimen size	• 20 (W) × 12(D) × 7(H) mm
Specimen swing angle	• ± 35°

Why Use a Cross Section Polisher?

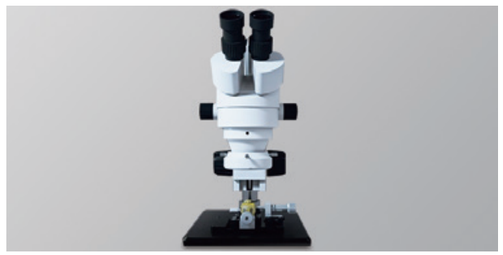
■ With the ever increasing requirements to image smaller and smaller structures, an appropriate way of preparing the specimen is required to avoid deformation and distortion of the specimen.
A Cross Section Polisher not only to preserves the internal structure of the specimen but also avoids chemical change as it does not require a chemical etching process. Only a minimal effort is needed to achieve a clean cross section surface.

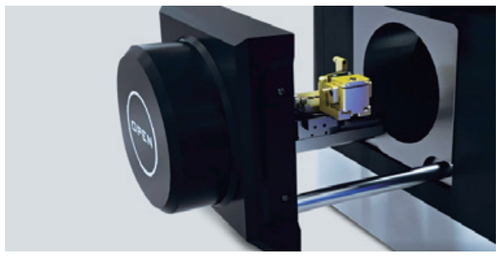
■ The ability to mill a wide range of samples, from microns to millimeters in width provides the same result as high-end micromachines such as FIB, making the CP-8000 an economical option to choose.



CP Process

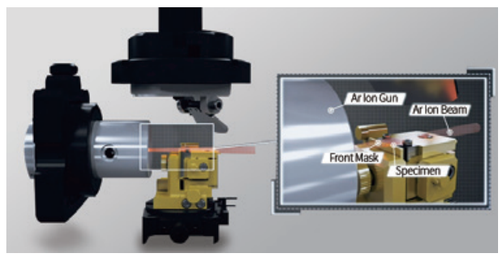
1.

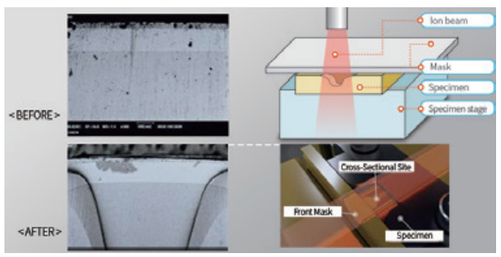




- Select a region of the specimen to be cross sectioned under the optical microscope and fix it on the specimen holder to load in CP-8000

2.

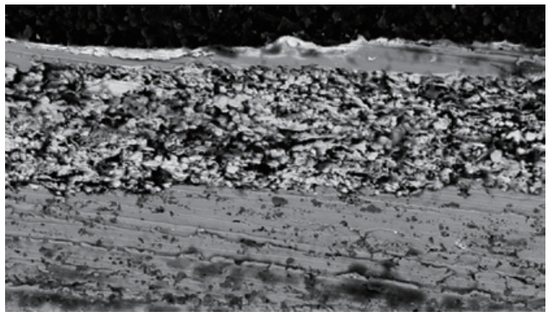




- A fine cross section surface is observed after the specimen has been swept by the Argon ion beam for polishing

Mechanical polishing vs CP polishing

■ Conventional mechanical polishing can cause surface damage that will inhibit clear and precise imaging. An ION mill is capable of polishing to a molecular level, providing a much better image without surface distortion or visible scratches from limitations of polishing media size.



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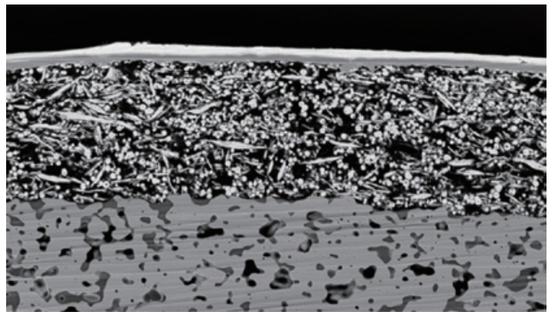
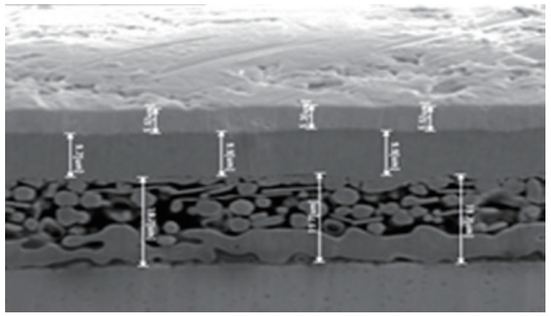
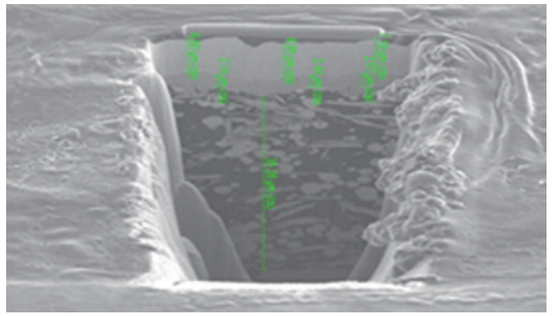
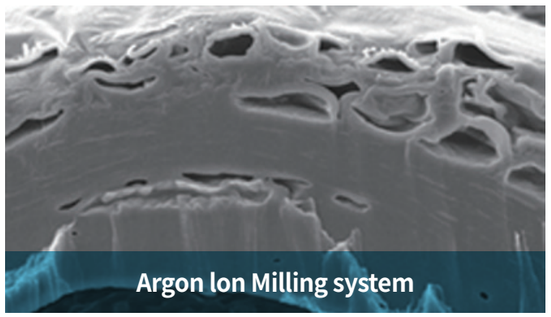


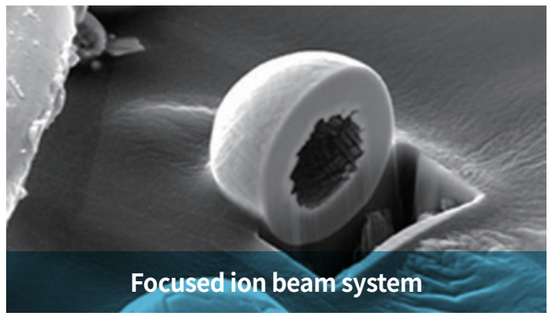
< After >

CP polishing vs FIB polishing









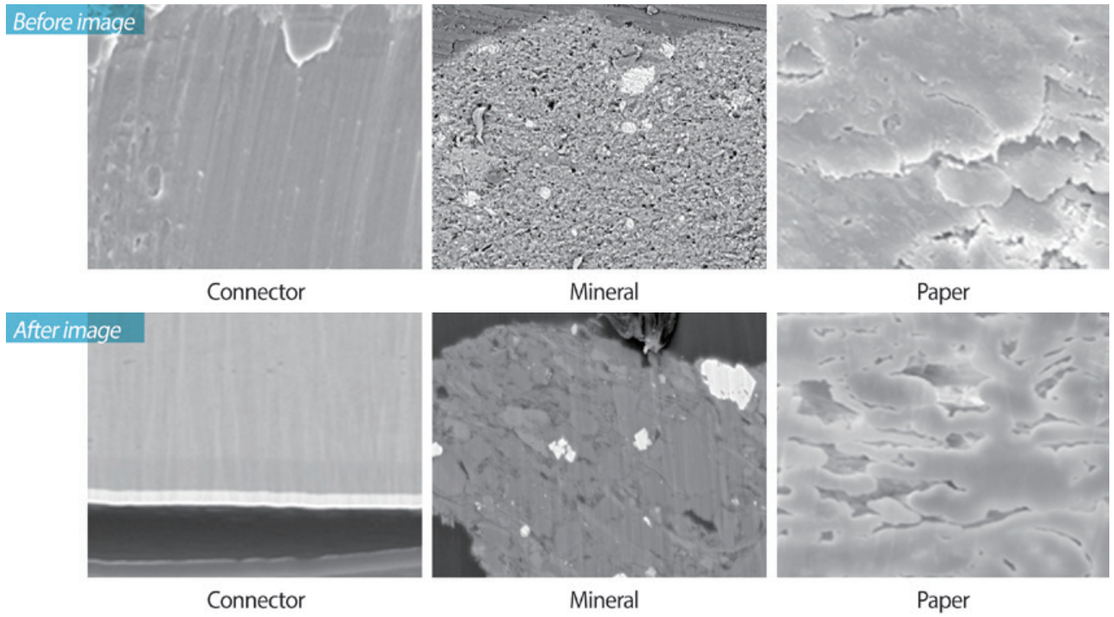
- While polishing on a FIB can provide an excellent surface, FIB systems are expensive and difficult to use. Polishing with the CP-8000 provides an equivalent surface, at a cost up to 10 times less than FIB.

CP-8000

CP Application

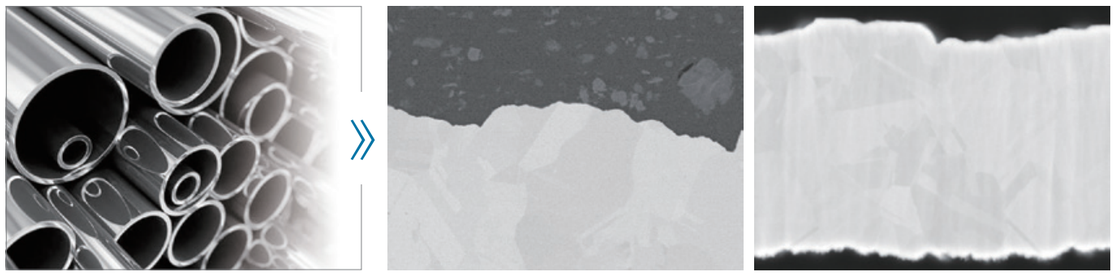
Navigate the nano world with Coxem

CP Applications



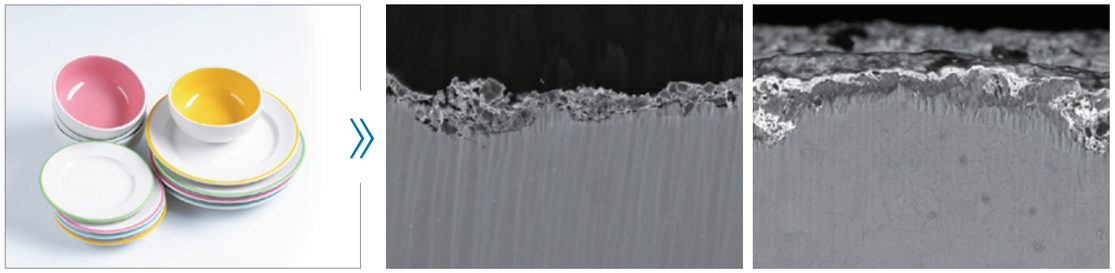
- A smooth cross section surface is obtained without deformation which cannot be achieved by scissors or razor blades

• Alloys

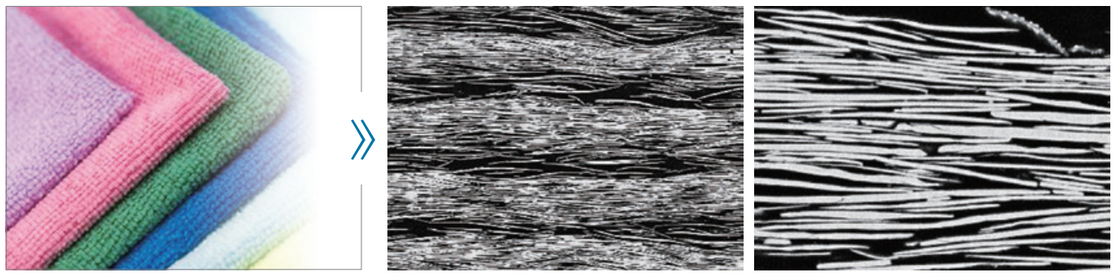


• Semiconductors

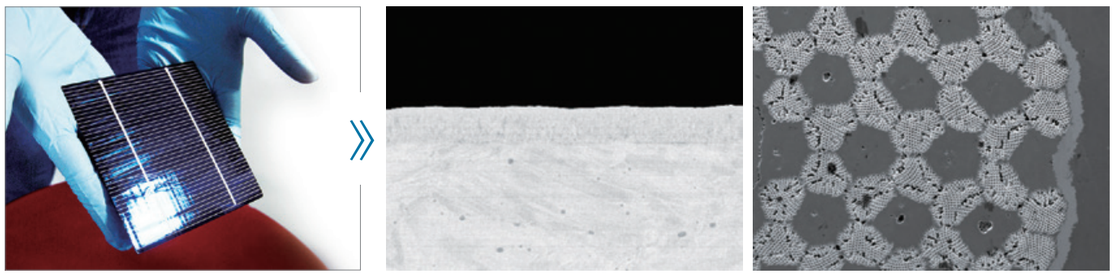
• Ceramic



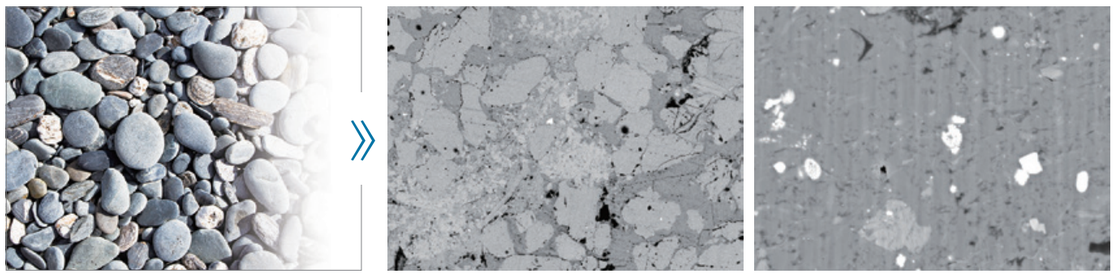
• Fiber



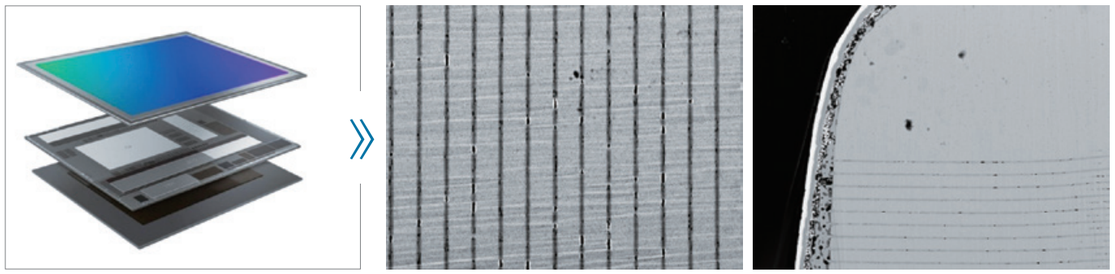
• Solar cell



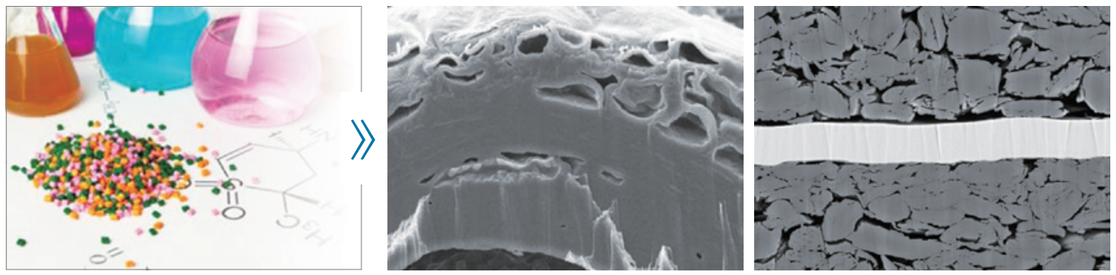
• Stone



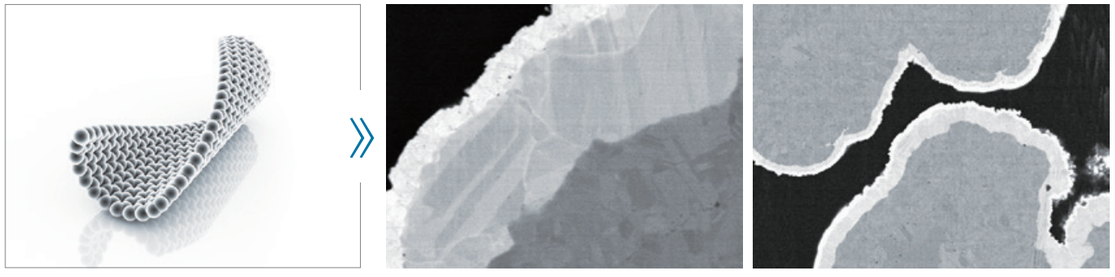
• Multilayer



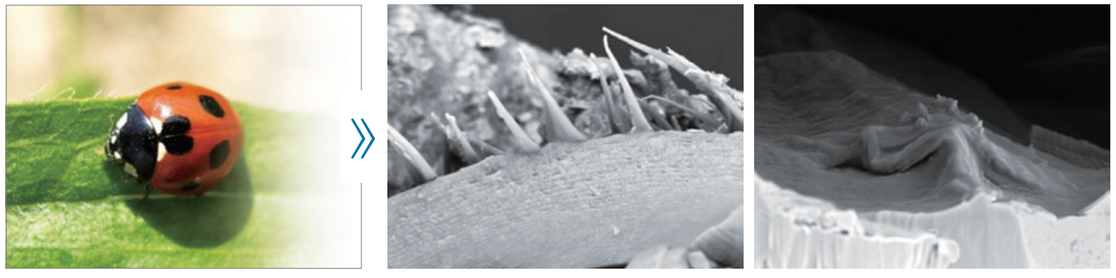
• Polymer



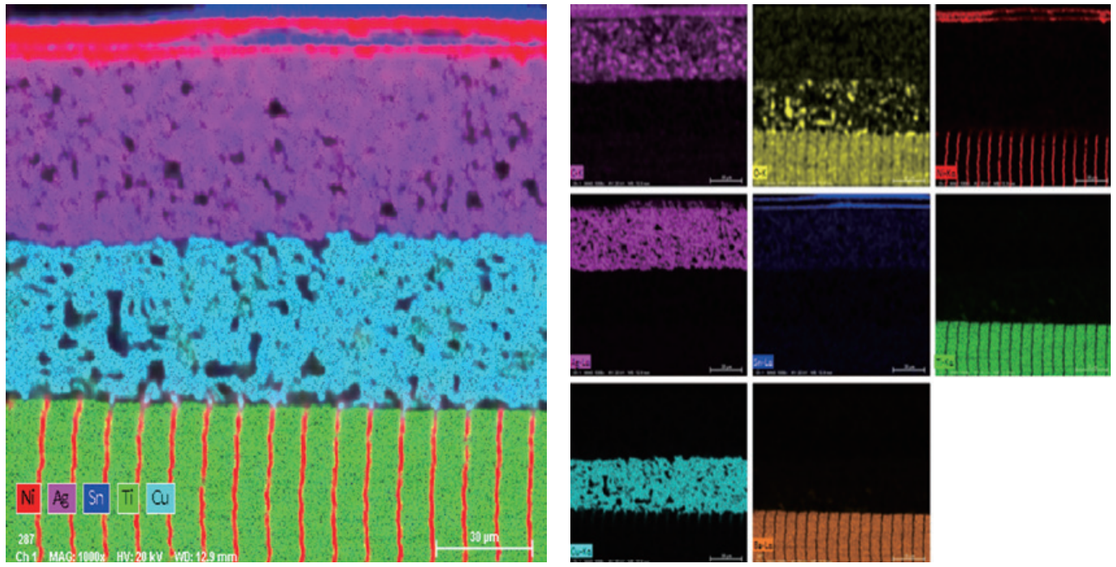
• Nano powder



• Natural Science

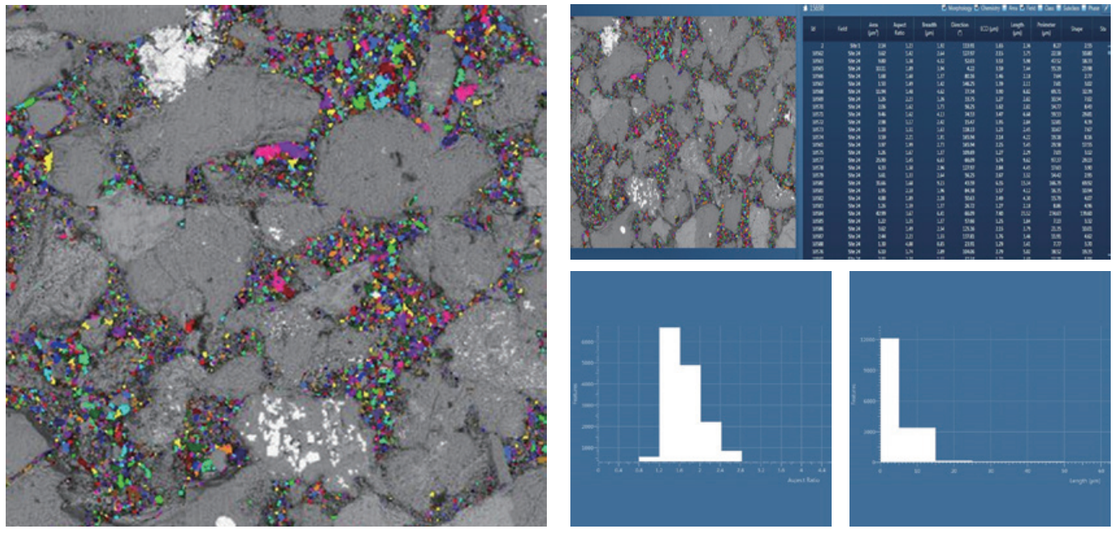


• EDS



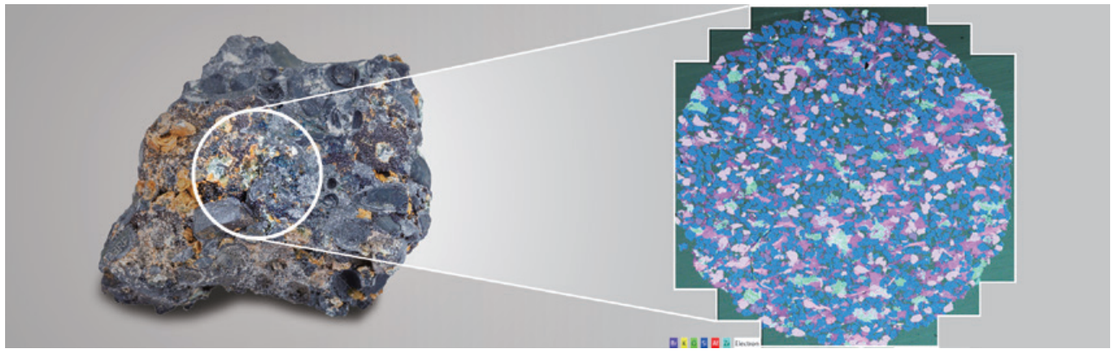
- After etching with CP-8000, the etching surface status of Multi Layer Ceramic Capacitor (MLCC) samples can be determined through EDS Mapping.

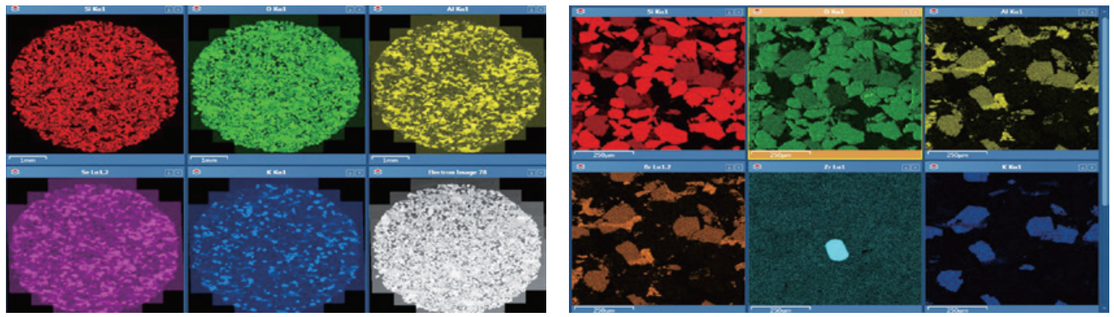
• Large Area Mapping (Analysis for Distribution of Pore size)



- The analysis of shale for gas production requires knowledge of pore size and distribution for efficient extraction. This example shows micro-and nano-sized pores widely spread across the sample. This sample was prepared using the CP-8000 for pore distribution analysis under SEM.

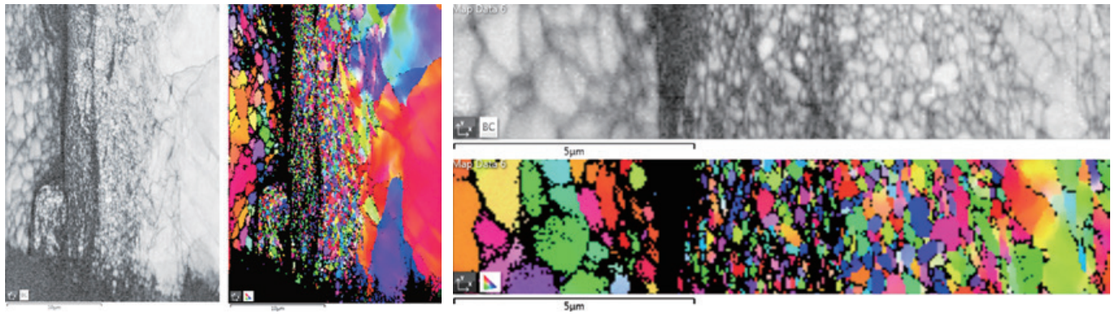
• Large Area Mapping (Analysis for Distribution of Mineral)





- Large area mapping is often used when examining samples for mineral content. Since most mineral samples are not homogeneous and many different minerals can be present, we need to understand the structural and chemical composition of the entire specimen. Cross section ion polishing is an efficient method used to prepare large samples for analysis in SEM.

• EBSD (Electron BackScatter Diffraction)



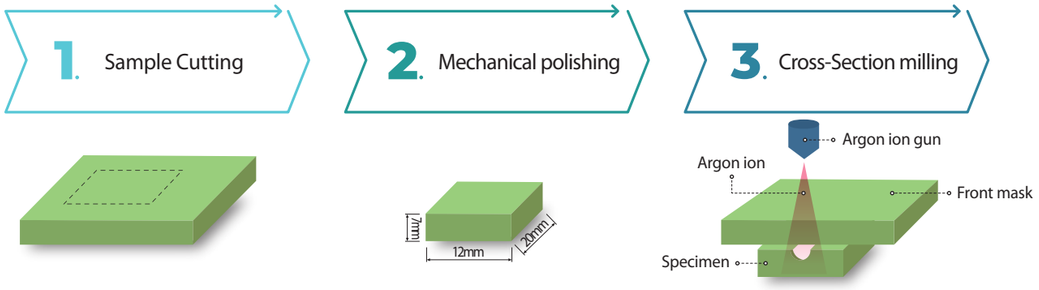
- EBSD (Electron backscatter diffraction) analysis provides useful crystallographic information of the sample, but it requires precise sample preparation. The ion milling process simplifies sample preparation and allows us to observe grains and grain boundaries in alloy and metallic samples

CP Operation Guide

▪ Sample Preparation Techniques

*Bulk samples

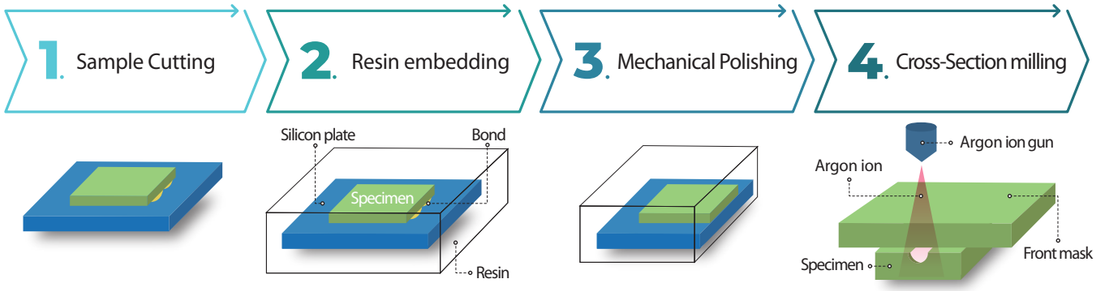
1. Sample Cutting
2. Mechanical polishing
3. Cross-Section milling



- A clean cross section surface is achieved from a bulk specimen after first doing a rough polish to the area of interest.

*Thin Films

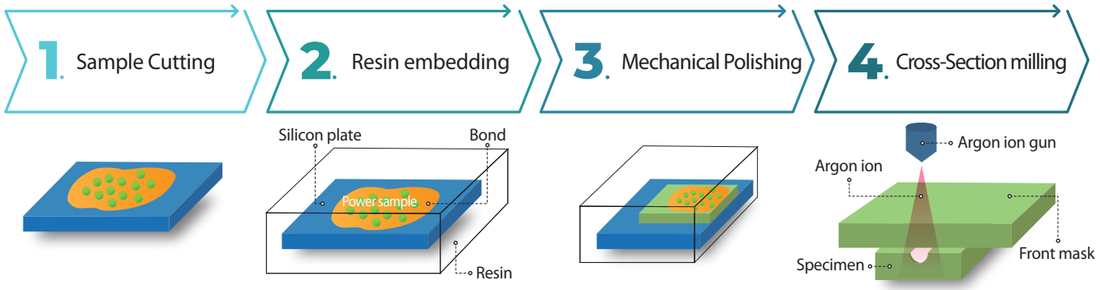
1. Sample Cutting
2. Resin embedding
3. Mechanical Polishing
4. Cross-Section milling



- In case of the sample not like polymer films that are not stiff enough to be fixed vertically on the specimen holder, embed the sample with epoxy resin to to support the sample and attain a quality finish for imaging

*Powder Samples

1. Sample Cutting
2. Resin embedding
3. Mechanical Polishing
4. Cross-Section milling

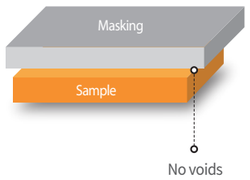


- In order to fix the powder sample on the specimen holder, embedding sample in an epoxy resin is needed to perform polishing.

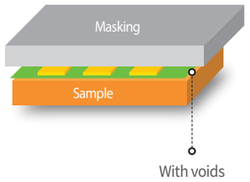
▪ How to achieve a perfectly cross sectioned surface

*When voids exist between the masking plate and a sample

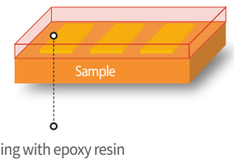
No voids found between the masking plate and a sample when flat

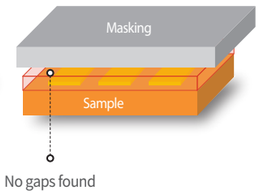


Voids are found between masking plate and a rough fracture surface sample

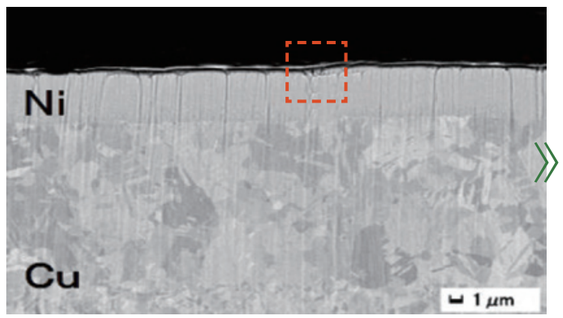


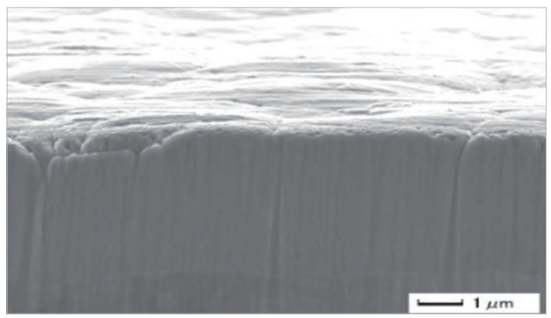
Use epoxy resin embedding methods to fill any voids to achieve a better ion milled cross section so that sample is well supported and fixed in place.



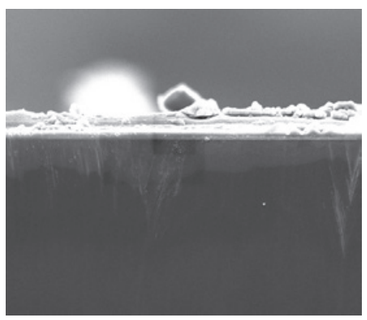


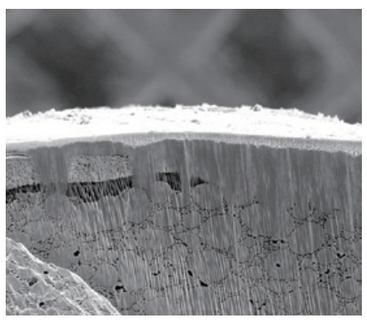
*Curtain effect

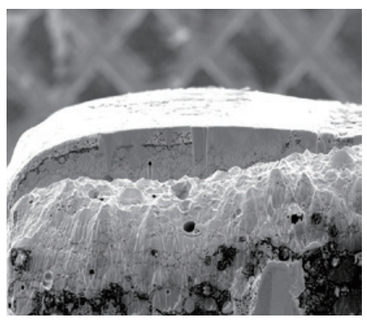




*Re-deposition



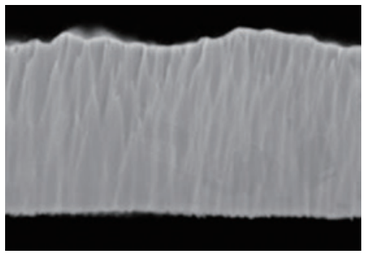


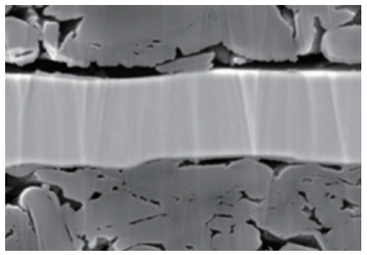


▪ Auto Beam On/Off

The Auto Beam On/Off Function minimizes heat deformation and ion beam damage, providing a higher quality cross section.

*Without Auto Beam On/Off





*With Auto Beam On/Off