PECS III System

Model 1686

The PECS™ III is a broad-beam argon ion milling system designed to produce consistent, high-quality surfaces across semiconductors, batteries, and advanced materials using a single, integrated workflow. It enables reliable surface preparation for complex, multi-material samples while minimizing operator dependence and preparation-induced artifacts.

Benefits

- **Consistent, high quality surfaces:** Produces uniform, low damage surfaces suitable for demanding analytical techniques across a wide range of materials.
- **High throughput for complex materials:** Improves milling rates by 4.4x and enables preparation of larger areas for faster, more meaningful results.
- **Up to 7x wider cross-section capability:** Prepares large area cross-sections with ease, supporting semiconductor, battery, and multilayer systems.
- **Universal, simple preparation across diverse materials:** Ensures predictable, repeatable outcomes independent of operator skill, reducing rework and preparation variability.
- **Streamlined workflow:** Delivers results using one preparation workflow, reducing handling steps and improving overall efficiency.
- **Integrated coating functionality:** Deposits consistently thin coatings to protect sample surfaces and enable analysis of delicate and non-conductive materials.

PECS III is optimized to support reliable materials characterization by minimizing preparation-induced artifacts that can obscure or distort analytical results. By producing uniform, low-damage surfaces across large areas through the use of a thickness monitor, the system enables clearer interpretation of microstructural features, crystallographic orientation, and phase distribution. This surface quality is especially important for techniques such as EBSD, EDS, WDS, CL, and Cipher®, where preparation damage or topography can directly affect data quality.

The system's ability to perform milling 4.4x faster on areas up to 7x wider allows users to examine more layers, interfaces, and features within a single preparation. This capability reduces the need for repeated re-preparation or supplementary milling steps, improving overall workflow efficiency. As a result, users can move from preparation to analysis more quickly while maintaining consistent surface quality across complex, multilayer, or heterogeneous samples.

By integrating preparation steps into a single, streamlined workflow, PECS III reduces operator dependence and variability



between users. This predictable performance supports reproducible outcomes across samples and laboratories, making the system well suited for shared facilities, high-throughput environments, and workflows that demand consistent results across diverse material systems.

Applications

- Semiconductor devices and multilayer structures
- Battery materials and air-sensitive samples
- Advanced alloys and composites
- Additive manufacturing and welded microstructures

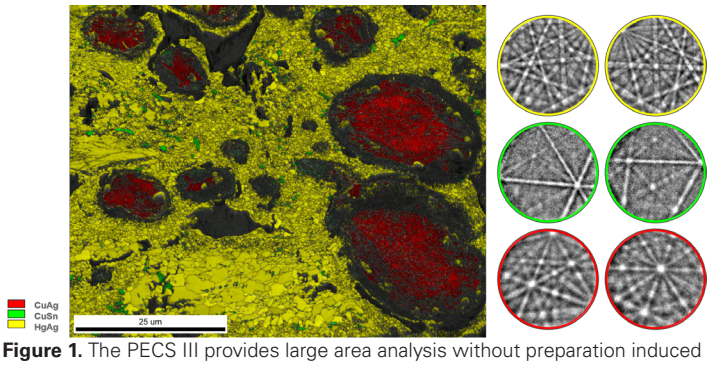


Figure 1. The PECS III provides large area analysis without preparation induced artifacts and allows you to analyze samples that have microstructures with local variations over large areas invisible with smaller areas. This example shows a EBSD phase map and representative EBSD patterns from a Cu-Ag-Hg-Sn multiphase alloy.

Specifications

Ion source	
Ion source	Two penning ion sources with rare earth magnets
Milling angle	0 – 18° Each source independently adjustable
Ion beam energy	0.1 – 10.0 keV
Ion current density peak	10 mA/cm^2
Milling rate on silicon	400 ± 40 µm/h
Beam diameter	Adjustable using gas flow controller or discharge voltage
Specimen stage	
Sample size (D x H)	32 x 20 mm
Wide milling sample mount Single sample Dual sample	 Up to 14 mm wide cross-sections Up to 10 mm wide cross-sections
Rotation	1 – 6 rpm
Beam modulation	Single, double with adjustable range
Viewing	Digital zoom microscope with PC and DigitalMicrograph® storage (optional)
Vacuum	
Dry pumping system	Two stage diaphragm pump backing an 80 L/s turbo drag pump
Pressure	5 x 10^{-6} torr (Base) 8 x 10^{-5} torr (Operating)
Vacuum gauge	Cold cathode type for main chamber Solid state for backing pump
Specimen airlock	WhisperLok technology
Specimen exchange time (min)	<1 min
User interface	
10-inch color touchscreen	Simple operation with complete control of all parameters and recipe operation
Dimensions and utilities	
Overall size (L x W x H)	584 x 532 x 774 mm
Shipping weight	45 kg
Power consumption	200 W (During operation) 100 W (Source off)
Power requirements with universal 100 – 240 VAC	50 – 60 Hz
Argon gas	25 psi

Specifications are subject to change.

Ordering

Model	Description
1686.C	PECS III Cold System (Cold Stage)
1686.O	PECS III Pro System (Digital Microscope, Thickness Monitor)
1686.A	PECS III Advantage System (Motorized Ion Sources)
1686.M	PECS III Met Etch System (Without Deposition)
1686.OV	PECS III ProTransfer System (Vacuum Transfer)

Configurable options

- Base configuration (room temp, LN_2 trap, or cold stage)
- Digital microscope
- Source control (manual, motorized)
- Coating (targets, thickness monitor)
- Transfer type (air, vacuum transfer pod)

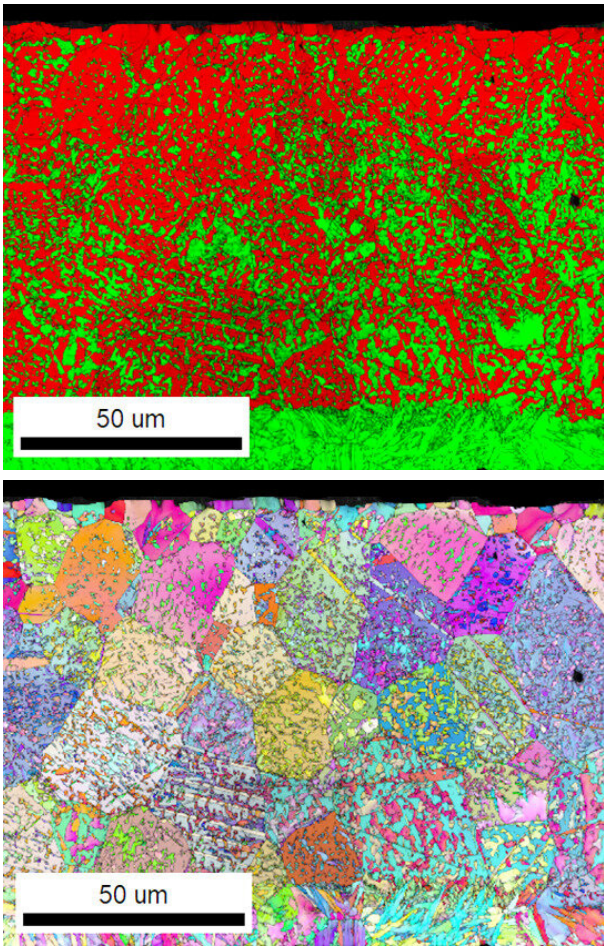


Figure 2. EBSD IPF orientation map (top) and phase map (bottom) of a titanium alloy with titanium hydride precipitates. This sample from a titanium a is difficult to prepare with mechanical polishing due to the hardness differences between phases. The PECS III reduces crystal lattice damage and delivers sharper EBSD patterns and clearer orientation measurements from all phases.

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