Hitachi Focused Ion & Electron Beam System

nanoDUE’T NB5000

NB5000

HITACHI
Hitachi’s high performance FIB-SEM provides unparalleled nano-analyses of devices and functional materials!!

Legendary Hitachi reliability and performance in an integrated system (Ultra-high performance FIB and high resolution FE-SEM) enabling high-throughput specimen preparation, high resolution imaging and analysis and precision nanofabrication. New low-damage fabrication techniques have been developed for materials sensitive to electron irradiation. Innovations in sample loading, sample navigation, and Micro-sampling increase analysis efficiency*1.
Features

- **Ultra-high performance FIB**
  Low Cs FIB optics\(^2\) deliver 50nA or more of beam current (at 40kV) in an about 1µm spot-size. The high current enables unconventional large-area milling, hard material fabrication and high throughput multiple specimen preparation.

- **New Micro-sampling\(^{*1,2}\)**
  Hitachi's patented Micro-sampling technology provides smooth probe motion. Also, the probe can be used for newly developed absorbed current imaging\(^*1\) to aid fault isolation.

- **High precision end-point detection**
  High resolution SEM allows high precision end-point detection. Section-view function, which displays an outline of the cross-section utilizing the real-time FIB image, is ideal for preparing electron irradiation sensitive specimens like Low-K material.

- **High resolution SEM**
  Hitachi's unparalleled SEM column and detector design\(^*2\) enables high resolution SEM imaging during and after FIB fabrication.

- **Holder compatibility with TEM/STEM\(^*1,2\)**
  A side entry STEM/TEM-type stage\(^*1\) allows the use of the same specimen holder (compatible with NB5000 and Hitachi TEM/STEM). No tweezers handling of specimen during transfer results in higher throughput TEM/STEM analysis.

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![Large-area milling of wire bonding](image1)

*(milled area: 75 (w) x 130 (h) µm, milling time: 19min.)*

![EBAC (Electron Beam Absorbed Current) imaging\(^*1\)](image2)

*Optional accessory
\(^1\) Hitachi patent
**Specification**

**FIB**
- Accelerating voltage: $1 \sim 40kV$
- Beam current: 50 nA or more @ 40kV (CP)
- SIM resolution: 5nm @ 40kV (CP)
- Magnification: x60 ~ x250,000
- Ion source: Ga Liquid Metal Ion Source
- Lens system: Low Cs 2-stage electrostatic lens system
- Accelerating voltage (SEM): 0.5 ~ 30kV
- SEM resolution: 2.1 nm @ 1kV (OWD)*
- High Mag mode: x250 ~ x800,000
- Low Mag mode: x70 ~ x2,000
- Electron source: ZrO/W Schottky emission
- Lens system: 3-stage electromagnetic lens reduction system

**SEM**
- Upper SE, Lower SE, Absorbed current**
- Lower SE, Absorbed current**
- Traverse range: X: 50mm (30mm*2), Y: 50mm (30mm*2), Z: 22mm
- T: -1.5 ~ 58.3°, R: 360°

**Signal selection**
- Electron (E), X-ray (X), Detectors (D), Scans (S)

**Eucentric stage**
- Traverse range: X: 50mm (30mm*2), Y: 50mm (30mm*2), Z: 22mm
- T: -1.5 ~ 58.3°, R: 360°

**Sample size**
- Maximum diameter: $\phi$50mm (30mm*2)
- Material: Wurtzite (Carbon) (changeable)
- Probe exchange: Load lock type
- Additional function: Touch sensing, Absorbed current imaging**

**Utilities**
- Temperature: 15°C ~ 25°C (Variation during operation: 2°C or less/hr)
- Humidity: 60% RH or lower
- Power: Single phase 200V (±10%), 5kVA (50/60Hz)
- Grounding: D class, Grounding resistance: 100Ω or less
- Water: Flow rate: 1.0 ~ 1.3L/min (Water pressure: 50 ~ 130kPa)
  - Water temperature: 10 ~ 20°C (Variation: 0.5°C or less/10 min.)
  - Air: 0.4 ~ 0.6 MPa, For valve control
- Gas: $N_2$ gas, Needed for N2 gas column leak

**Optional accessories**
- Holder scope, Absorbed current imaging, Automatic fabrication software, Side entry stage, Specimen rotation holder, Energy Dispersive X-ray spectrometer (EDX), Water circulator, Air compressor, Dry pump

**Dimensions and weight**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Width x Depth x Height (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main unit</td>
<td>933 x 1,747 x 1,000</td>
<td>1,120</td>
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<tr>
<td>Operation unit</td>
<td>1,200 x 1,025 x 740</td>
<td>186</td>
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<tr>
<td>Power supply</td>
<td>980 x 640 x 1,565</td>
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<td>Transformer</td>
<td>980 x 454 x 625</td>
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<td>SE power supply</td>
<td>394 x 754 x 780</td>
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<td>Buffer tank (x2)</td>
<td>@250 x 280 x 665</td>
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<tr>
<td>Dry pump**</td>
<td>400 x 252 x 336</td>
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<tr>
<td>Water circulator**</td>
<td>450 x 400 x 660</td>
<td>55</td>
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<tr>
<td>Air compressor**</td>
<td>400 x 230 x 550</td>
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<tr>
<td>Weight</td>
<td>200 x 180 x 160</td>
<td>40</td>
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</table>

**Layout**

![Layout Diagram]

**NOTICE:** For proper operation, follow the instruction manual when using the instrument.

Specifications in this catalog are subject to change without notice, as Hitachi High-Technologies Corporation continues to develop the latest technologies and products for our customers.

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