

Titan Themis-Z (Thermo fisher Scientific)



The Thermo Fisher Scientific Themis Z is **an ultra-high resolution, double aberration-corrected**, transmission electron microscope for analytical scanning probe and wide-field microscopy delivering ultimate optical performance and flexibility. This high-end analytical (S)TEM is used to answer the most complex questions regarding materials science.

Characteristics & Accessories

spatial resolution better than 70 pm

system energy resolution obtained is 70 meV

high-brightness electron gun

Wien-type monochromator

Two Rose-Haider double-hexapole aberration correctors (probe and image)

Super-X large solid angle X-ray detector for EDS

High-performance energy loss spectrometer for EELS and EFTEM

OneView high-speed CMOS camera for wide-field TEM imaging and in-situ data recording

Multiple STEM detectors for bright-field, annular dark-field, differential phase contrast

Four acceleration voltages in TEM and STEM

Low voltage operation at 40 kV

ornell pixelated STEM detector for 4D-STEM (EMPAD)



FEI Tecnai G2 F30

The FEI Tecnai G2 F30 field emission transmission electron microscope is produced by the American company FEI. The main accessories equipped with this equipment are: Gatan's ultrascan CCD, high-angle annular dark field (HAADF) detector, Oxford's EDAX composition analysis system, and Gatan's post-positioned electron energy loss spectroscopy (PEELS) system.

The FEI Tecnai G2 F30 transmission electron microscope can perform the following tests:

1. Electron diffraction and diffraction contrast analysis
2. High-resolution transmission electron microscopy (HRTEM)
3. Scanning Transmission Imaging STEM
4. X-ray energy dispersive spectroscopy (EDS) analysis
5. Electron Energy Loss Spectroscopy (EELS) and Energy Filtered Transmission Electron Microscopy (EFTEM) Techniques
6. 3D-Tomography

The main technical specifications are: Schottky field emission gun (FEG), point resolution of 0.205 nm, line resolution of 0.102 nm, information resolution of 0.14 nm, STEM-HAADF mode resolution of 0.17 nm, objective chromatic aberration coefficient of 1.4 mm, objective spherical aberration coefficient of 1.2 mm. The calculation work of electron diffraction simulation and high-resolution image simulation is performed using Jems software, which is mainly used to simulate experimental images taken on the F30 electron microscope. During simulation, the parameters of the electron microscope are set as follows: acceleration voltage of 300 kV, objective chromatic aberration coefficient of 1.4 mm, objective spherical aberration coefficient of 1.2 mm, energy spread of 0.8 eV, and half convergence angle of 0.2 mrad. In addition to conventional morphology, diffraction, and high-resolution image observation, the F30 transmission electron microscope is equipped with a high-angle annular dark field detector (HAADF) for collecting high-angle annular dark field images and Z-contrast images; a characteristic X-ray energy spectrometer (EDS) for nanoscale composition analysis with an energy resolution of 130 eV.



FEI spirit T12

The Tecnai G2 Spirit 120kV transmission electron microscope operates at an accelerating voltage of 120kV and is suitable for material morphology observation, composition analysis, and rapid screening. It is particularly adept at structural characterization of carbon materials, biological materials, and materials that are not resistant to radiation. Specific features include:

Observation of sample morphology and size;

Phase structure electron diffraction analysis;

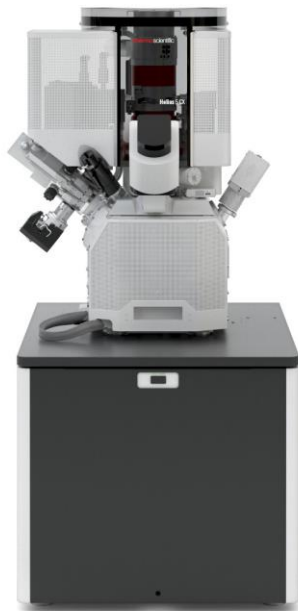
High-resolution transmission electron microscopy (HRTEM);

EDS analysis of element types;

Technical parameter:

Electron gun: LaB6

Point resolution: 0.34 nm



Helios 5 CX

Technical parameter:

Electronic current range: 0.8 pA to 176 nA

Accelerating voltage: 200 V-30 kV

Energy range of electron landing: 20 eV-30 keV

Ion east flow range: 1 PA-100 nA

Ion resolution at the intersection: 4.0 nm @30 kV



Model 1061 SEM Mill

Design of Electromagnetic Focused Ion Gun

Ultra-wide accelerating voltage range up to 10keV, high polishing efficiency

Minimum 100eV, nearly no damage after repair

Equipped with a liquid nitrogen cooling station, it can maintain continuous cooling for over 18 hours, effectively removing thermal damage

It has both section cutting and plane polishing functions

Vacuum transfer and vacuum interconnection



HITACHI SU8010

Technical parameter

Electron gun: cold cathode field emission electron source

Magnification: 20 to 2K in low-magnification mode, and 100 to 800K in high-magnification mode

Accelerating voltage: 0.1~30kV, 0.1kV/step, variable

Secondary electron resolution: 1.0nm 15kV, 1.3nm 1kV, deceleration mode, 2.0nm1kV, normal mode

Sample table X: 0~50mm Y: 0~50mm Z: 1.5~30mm T: -5~+70° R:360°

Maximum sample size: 100mm

Spectrometer: effective crystal active area: 30mm²; resolution better than 128eV; detection element range: Be(4)-Pu(94)

Gold plating machine: dual systems for platinum and carbon plating; capable of accommodating samples with dimensions of $\phi 60 \times 20$ mm



Thermal Fisher Apreo 2S HiVac

SEM/EBSD

Thermal Field Emission

SE resolution:

0.7nm at 30kV STEM;

0.5nm at 15kV beam deceleration;

0.9nm at 1kV;

0.8nm at 1kV beam deceleration;

0.8nm at 500V beam deceleration;

Energy Dispersive Spectroscopy:

Effective area of 65mm², designed with a high-molecular ultra-thin window.

Element analysis range: Be₄—Cf₉₈;

Resolution: Mn Ka ensures better than 127eV at 130,000 cps;

Maximum output count rate: capable of handling a maximum count rate of 1,600,000 CPS, with a maximum output count rate of >850,000 CPS;

Electron Backscattered Diffraction:

The EBSD detector utilizes the latest CMOS image sensor technology, providing exceptional pattern analysis capabilities.

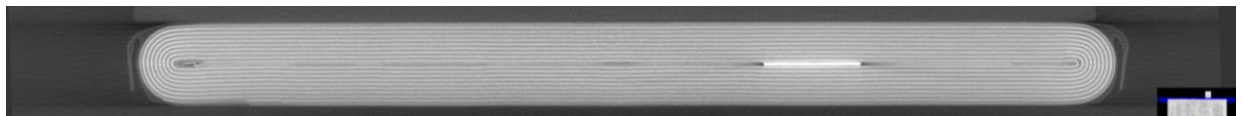
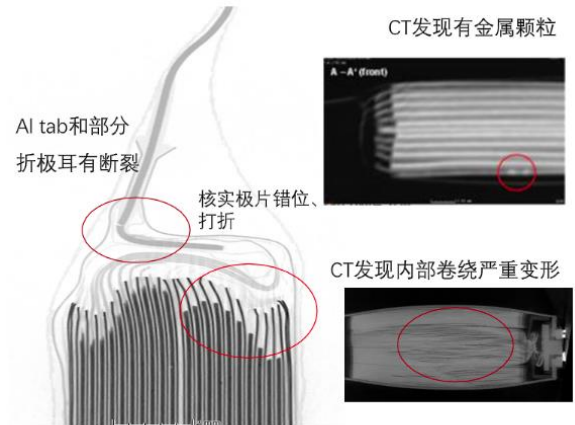
The EBSD pixel resolution reaches up to 1244*1024, with a maximum acquisition speed of 240 points per second at this resolution.

The maximum online acquisition speed of EBSD is superior to 4500 points/second, with a pattern resolution of 156x88 pixels at the highest speed.

Angular resolution can reach 0.05 degrees.

Werth Tomoscope L 300 (CT 1#)

Micro-nano tomography scanner



Phoenix V | tome | x (CT 2#)

Waygate Technologies



Advantages

High-quality images achieved through scatter|correct technology

High-speed scanning based on exclusive patented detector technology

Highly reliable metrology accuracy

Optional 300 kV micro-focus and 180 kV nano-focus Dual|tube setup for maximum flexibility

Industry-leading micro-focus magnification effect under 300 kV conditions

Applications

The Phoenix V|tome|x M300 system boasts extremely wide application capabilities:

Internal defect analysis

3D quantitative pore analysis

Component control

Material structure analysis for small-sized, highly absorbent castings

NanoCT with the highest precision for small-sized or low-absorbency samples



Bruker D8 ADVANCE

The Bruker D8 Advance diffractometer is a high-performance X-ray diffractometer. This instrument plays a crucial role in various fields such as materials science, physics, chemistry, and pharmaceuticals due to its superior performance and wide range of applications.

Instrument Features

High Precision: The D8 Advance diffractometer boasts exceptional peak position accuracy, with a peak position accuracy of $\leq 0.01^\circ 2\theta$, ensuring the accuracy of measurement results.

Versatility: This instrument is suitable for measuring various types of samples, including liquids, powders, films, and solid blocks.

Ease of Use: Equipped with Bruker's unique DAVINCI design, the instrument requires no tools or alignment for configuration changes. It is supported by automated real-time component recognition and verification,

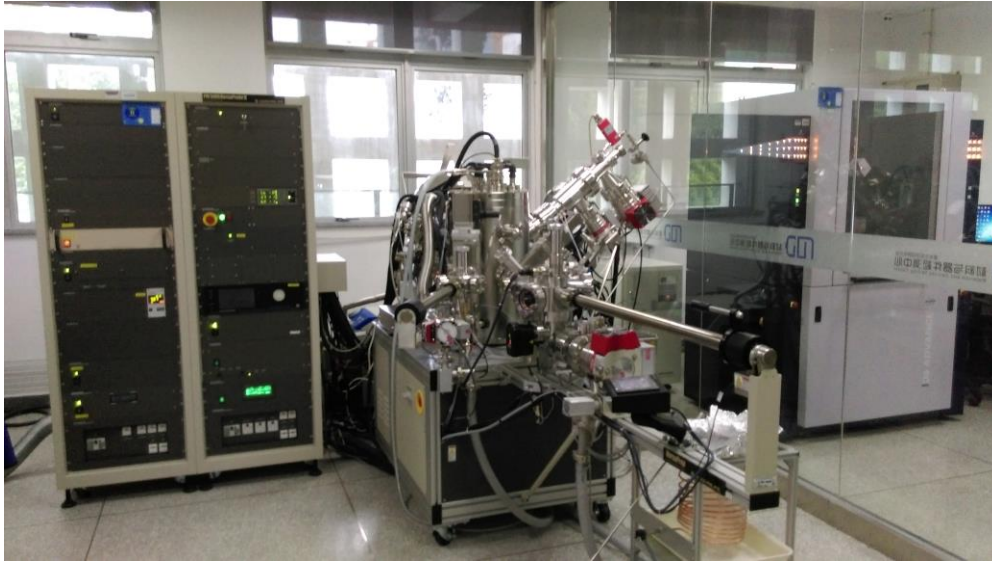
making it easy for both novice and expert users to make configuration adjustments.

Accessories of this diffractometer and their features:

1. High-Temperature Accessories:
2. In-situ Battery Accessories:

By equipping these accessories, the Bruker D8 Advance diffractometer can flexibly adapt to various research and analysis needs, providing powerful technical support for researchers.

PHI5000VersaProbell (XPS)



Technical parameter

X-ray source: monochromatic Al K α ray source, capable of focusing and scanning the sample surface within a range of 10 μ m to 200 μ m by 200 μ m;

Testing: It can achieve low working power of 1~100W, small angle resolution of $\leq \pm 1^\circ$, and temperature controllable in situ testing from -120°C to 500°C;

Ar ion gun + Ar cluster ion gun: Meet the requirements of surface etching and deep analysis of samples such as metals, ceramics, organic polymers, composite materials, semiconductor materials and devices;

UV light source UPS: The standard sample for testing the valence band and work function is better than 100 meV;

Dual-beam neutralization system: independently adjust the electron beam down to 1~2eV and the ion beam, achieving high-quality spectra with C1s FWHM ≤ 0.85 eV in O=C-O in PET;

The Al/Mg dual anode can meet the need for accurate peak position information discrimination;

Time of Flight Secondary Ion Mass Spectrometry (TOF-SIMS)



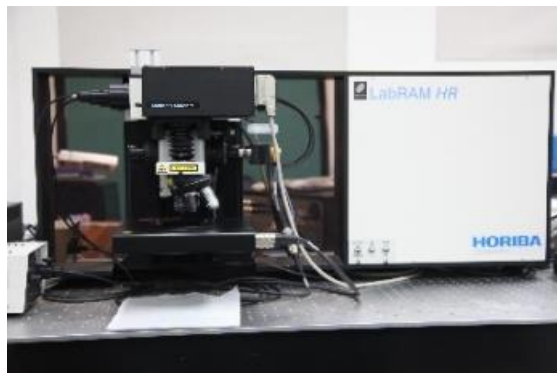
Feature of TOF-SIMS

1. TRIFTM three-time focusing analyzer is suitable for samples with flat, uneven, and complex surface topography.
2. Equipped with a newly developed ion gun, the spatial resolution can reach a minimum of 70nm.
3. Multiple sputtering ion guns enable depth analysis for three-dimensional imaging
4. SmartSoft M-TOF software, sample analysis operation is simpler and easier
5. Multi-function sample processing
6. Double-beam charge neutralization

Renishaw inVia QONTO (Raman #1)



HORIBA LabRAM HR800 (Raman #2)



Ultraviolet-visible near-infrared photometer
Cary 5000



Trace1300-ISQ (GC-MS)



1515 Isocratic HPLC



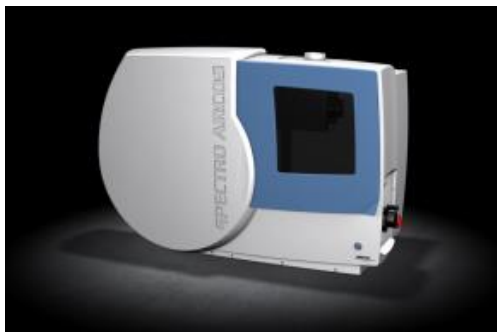
Aquion (IC)



Arcos II MV (ICP-OES)

Elementa EL Cube

Arcos II MV (ICP-OES)



CHNSO elemental analyzer



Bruker Dimension Ico (AFM 1#)



Bruker Innova (AFM 2#)



Nano-infrared spectrometer

Bruker Anasys nano IR3



High-frequency infrared carbon sulfur analyzer





Battery test system

MACCOR 5V5AS4000

MACCOR 10V15AS4000

MACCOR 5V100S4000

MACCOR 10V200A/10V
500AS4000H

Gloveboxes, Dry room and Battery Prototype Line

