

High-Resolution Transmission Electron Microscope

FEI Titan Themis3 60–300

DESCRIPTION

The TEM FEI Titan™ Themis provides easy access to atomic information about electron transparent samples. The microscope combines high-brightness X-FEG module with monochromator, 3-lens condenser, SUPER-X EDX detector, image (Cs)-corrector and high-end GATAN GIF Quantum ERS/966 energy filter for EELS and EFTEM to achieve comprehensive results. New enhanced piezo stage, FEI Ceta 4kx4k 16-bit CMOS camera, multiple STEM detectors (BF, ADF, DPC and HAADF), implemented Lorentz lens, variation of analytical holders (ST, DT, Tomographic and Cryo), and sophisticated SWs for data acquisition and post-processing enable that the microscope can be used as a complex and automated tool for materials science.



| RESOLUTION and DETECTION LIMITS: | | STEM RESOLUTION (300 kV): | |
|----------------------------------|----------|---------------------------|---------------|
| TEM INFORMATION LIMIT (300 kV): | ≤ 70 pm | PIEZO STAGE STEP: | ≥ 20 pm |
| TEM INFORMATION LIMIT (120 kV): | ≤ 90 pm | EDX ENERGY RESOLUTION: | ≤ 136 eV |
| TEM INFORMATION LIMIT (60 kV): | ≤ 100 pm | EDX DETECTION LIMIT: | Z ≥ 5 (Boron) |
| LORENTZ TEM RESOLUTION (300 kV): | ≤ 2 nm | EEELS ENERGY RESOLUTION: | ≤ 0.2 eV |

ACCELERATOR – offers alignment of high tensions to 60 kV, 120 kV or 300 kV to minimized knock-on damage of beam sensitive samples, high contrast for light compounds or ultimate resolution and penetration power for dense materials, respectively.

MONOCHROMATOR – narrows the energy spread of electron source to achieve 70 pm lateral resolution in HR-TEM or high energy resolution in EEL spectroscopy as low as 100 meV.

Super-X EDX DETECTOR – is a spectrometer with four 30 mm² SSD windowless detectors. Along with its optimized geometry (0.7 srad solid angle), high brightness X-FEG Shottky electron source and 100,000 spectra/sec fast data acquisition it allows very fast and sensitive chemical analysis.

IMAGE CORRECTOR – is spherical aberration (C_s)-corrector, CEOS GmbH, which boosts the resolution in the HR-TEM mode to the sub-Angström level. It minimizes the effect of delocalisation in HR-TEM imaging which enables to determine artefact free atomic coordinates.

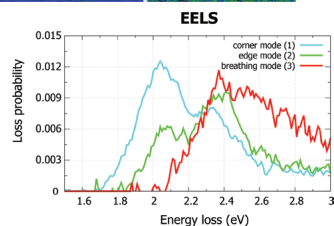
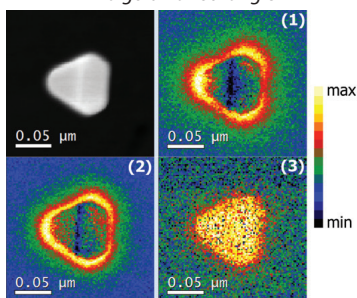
LORENTZ LENS – is within the lower pole piece of the objective lens and enables to image magnetic structures in field-free conditions (the objective lens is turned off). Focusing the Lorentz lens allows imaging of magnetic domains with different properties.

DPC – is a STEM differential phase contrast imaging technique providing access to in plane magnetic or electric fields of a material via measurements of shifts in the center of gravity of the diffraction pattern.

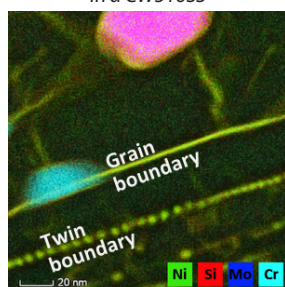
GIF QUANTUM ERS/966 – is a post-column energy filter, Gatan, Inc., allowing to form energy-filtered images, energy-filtered diffraction patterns and electron energy-loss spectra. The Quantum™ ERS is perfectly matched to monochromated electron beam, enabling high-resolution EELS.

APPLICATIONS RESULTS

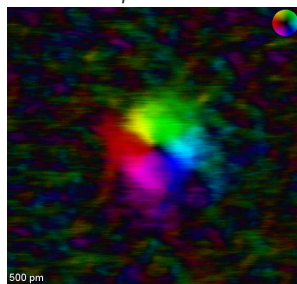
Monochromated STEM-EELS: Plasmon resonances in a gold nanotriangle



STEM-EDX: Radiation-induced microchemistry in a CW316SS

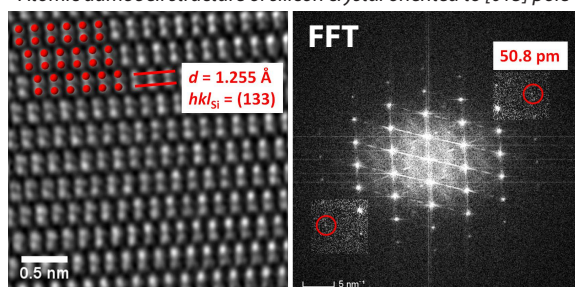


STEM-DPC: Projected electric field vector colour map around a defect



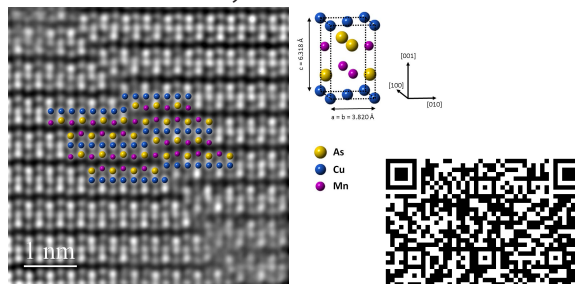
Cs-Corrected HR-TEM Imaging (300 kV):

Atomic dumbbell structure of silicon crystal oriented to [013] pole



HR-STEM-HAADF Imaging (300 kV):

Z-contrast atomic resolution image of a defect in CuMnAs crystal



MORE INFO

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