Zero-loss image of TiO₂ particles.

Ti L pre-edge image at 436 eV.

Ti L post-edge image at 481 eV.

Ti L map at 10 degrees tilt.

Ti L map at 20 degrees tilt.

Ti L map at 30 degrees tilt.

The 3-dimensional arrangement of the titania particles can be seen by viewing the above maps as stereo pairs.

GIF Tridiem Specifications

**Imaging**

- Entrance aperture: 5 mm
- EFTEM field of view: 20 µm (diagonal, select TEM models)
- Maximum defraction angle: 150 mrad (select TEM models)
- Non-isochromaticity: < 1.25 eV
- Distortion: < 1.75 %
- Chromaticity: < 1.5 mrad/µm
- Detector resolution: 2048 x 2048 pixels (UltraScan™ sensor with HCR™ technology)
- EFTEM readout speed: 4 frames/sec (EFTEM, 512 x 512)
- Viewing readout speed: > 10 frames/sec (Cinema mode, 512 x 256)

**Spectroscopy**

- Filter energy resolution: 0.25 eV
- Attainable system resolution: 0.6 eV (0.56 eV TEM with cold FEG, 0.25 eV GIF)
- Detector channels per readout: 2048
- Detector dynamic range: 0 – 60000 counts/ch
- Detector noise: < 6 counts/ch
- Maximum readout speed: > 30 spectra/sec
The GIF Tridiem represents Gatan’s 3rd generation of post-column energy filters. It combines 3rd-order spectrometer aberration correction with a multi-port, high-speed, high-resolution CCD sensor to yield a system that defines the new state-of-the-art in the capture of highly-detailed EELS and EFTEM data sets with maximum throughput. This new GIF, combined with the Gatan Microscopy Suite (GMS) software, is ideally suited for generating and working with the rich 3-dimensional data sets demanded by today’s analytical electron microscopists, including EFTEM and EELS STEM spectrum images, EFTEM tilt and tomography series, and time series. GIF Tridiem makes such tri-dimensional EM readily accessible.

The key features of the GIF Tridiem system include:

- Large collection semi-angle for energy-filtered diffraction: 120 mrad, full azimuth (on selected TEM models)
- Large field-of-view for energy-filtered TEM imaging and mapping: 20 μm, diagonal (on selected TEM models)
- Excellent isochromaticity over the entire EFTEM field-of-view: deviations < 1.25 eV
- Very large searchable field-of-view in unfiltered TEM mode: > 200 μm, diagonal (on selected TEM models)
- Rich EELS detail with each spectrum readout: > 2000 channels (e.g. capture 600 eV range at 0.3 eV/channel)
- Exclusive “cinema mode” readout for smooth, high-quality real-time viewing: > 10 frames/sec
- High spectrum readout rate for STEM spectrum imaging: > 30 spectra/sec

(Above) Zero-loss image of grating replica showing large field of view for EFTEM. Grating pitch is 463 nm. Inset shows energy deviation across image field corrected thru 3rd order to < 2 eV.

(Above) Zero-loss filtered Si [111] CBED pattern taken at 200 keV. FOLZ ring represents scattering angle of 78 mrad.

Series of elemental maps from copper-titania powder embedded in resin showing clear evidence of oxide layer surrounding copper particles.

(Right) Thickness and elemental maps formed from ionization-edge signals of N-K, Ti-L, O-K, Al-K, and Si-K.

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(Above) Zero-loss image of grating replica showing large field of view for EFTEM. Grating pitch is 483 nm. Inset shows energy deviation across image field corrected thru 3\textsuperscript{rd} order to < 2 eV.

(Above) Zero-loss filtered Si [111] CBED pattern taken at 200 keV. FOLZ ring represents scattering angle of 78 mR.

(Series of elemental maps from copper-titania powder embedded in resin showing clear evidence of oxide layer surrounding copper particles.)

(Lat) Color composite of all 5 elemental maps displayed at right, clearly showing the construction of the device.

(Left) Spliced 6000-channel EELS spectrum (log of intensity) at C-K edge. This detailed spectrum contains features for all elements in device area shown below.
**GIF Tridiem Specifications**

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- **Distortion**: < 1.75 %
- **Chromaticity**: < 1.5 µm/eV
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- **Detector dynamic range**: 0 – 60000 counts/ch
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