STEM Diffraction Imaging

Model 703.50

The scanning transmission electron microscopy (STEM) diffraction imaging software module combines the information-rich nature of electron diffraction with the spatially resolved power of spectrum imaging (SI), enabling 4D STEM experiments (acquisition of diffraction patterns at each probe position). In direct analogy with elemental mapping from spectrum images, any feature that can be measured from a diffraction pattern can be mapped interactively from the acquired diffraction image data set.

The STEM diffraction imaging software is an extension to our industry-standard STEM SI suite, providing the ability to acquire spatially resolved diffraction patterns using software synchronization with Gatan legacy CCD cameras. A diffraction image is similar to a spectrum image, but with a diffraction pattern stored at each pixel location instead of a spectrum. Data acquisition in STEM diffraction imaging is performed via the same interface as a regular STEM SI, and can be performed simultaneously with compatible signals (e.g., energy dispersive x-ray spectroscopy (EDS) and cathodoluminescence (CL)).

Once acquired, the 4D data cube can be viewed and analyzed within the DigitalMicrograph® (DM) environment. This provides a wide range of 4D STEM analysis tools such as virtual apertures, strain mapping, and differential phase contrast (DPC) imaging.

Benefits

- Automated software synchronized data acquisition
- Easy to use interface
- Simultaneous capture of compatible signals (e.g., EDS, CL)
- Robust spatial drift correction
- Data format compatible with Gatan's state of the art 4D STEM data analysis tools (virtual apertures, strain mapping, differential phase-contrast imaging)
- Only compatible with Gatan CCD cameras, including pre- or post-GIF CCD camera

Applications

- Material science

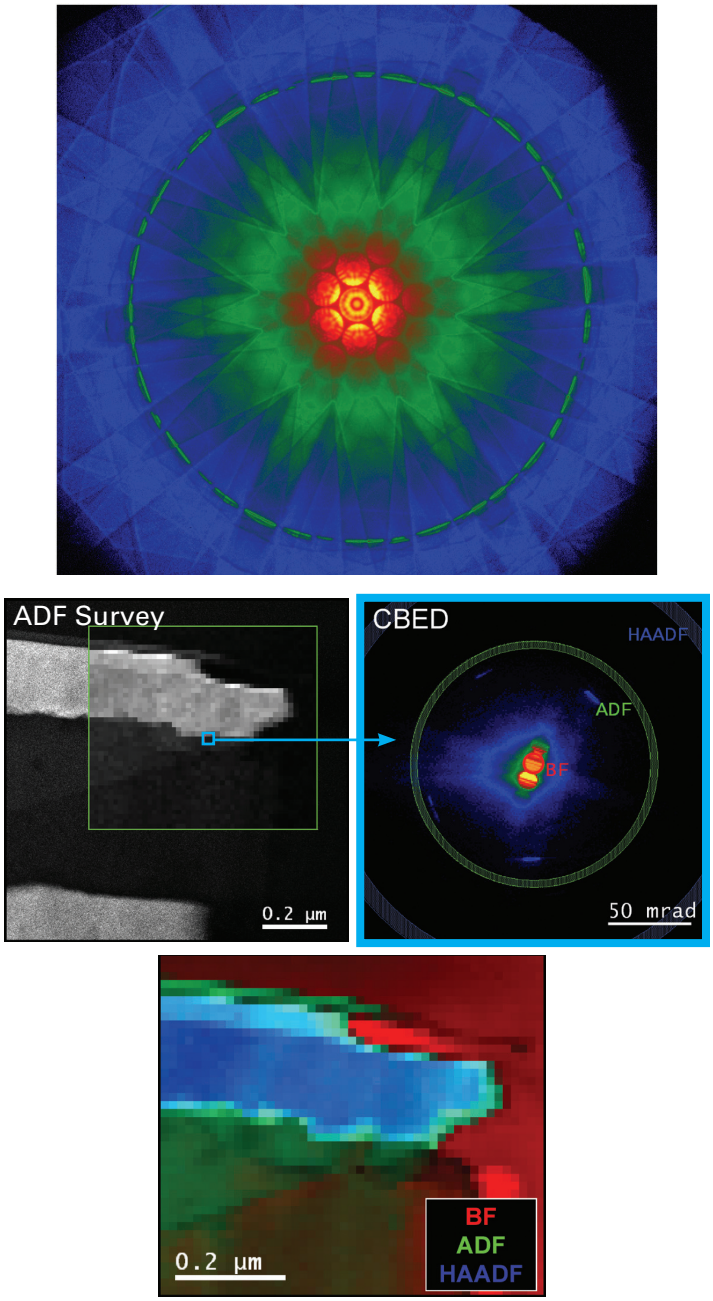

Figure 1. Images clockwise, starting top left: A diffraction image example taken from a semiconductor gate device. Using an ADF survey image (left), an energy-filtered diffraction image was acquired from the region marked in green using a GIF Tridiem® system. A convergent beam electron diffraction (CBED) pattern, extracted from the point marked in blue is shown on the right. The RGB composite image (bottom) computed using the virtual apertures capability in DM comprising of a BF image (red), an ADF image (green, 60 – 65 mrad), and a HAADF image (blue, 120 – 130 mrad).

Requirements

Product	System requirements
STEM diffraction imaging	DigitalMicrograph software Gatan CCD camera (including GIF camera) DigiScan™ I or II equipped with an annular DF detector[1]

[1] Supported DigiScan compatible detectors include the model 805 BF/DF STEM detector and the model 806 HAADF detector. Note: Detector must be in an appropriate position for use while CCD camera is inserted. Also, spatial drift correction is only supported for GIF cameras.

Specifications are subject to change.

Ordering

Model	Description
703.50	STEM diffraction imaging software (includes 4D viewer software and DIFPACK)
703.00P	Spectrum imaging base package (if not already present at customer site)
The offline 4D STEM Analysis	
1020.31	STEMx® Analysis Software

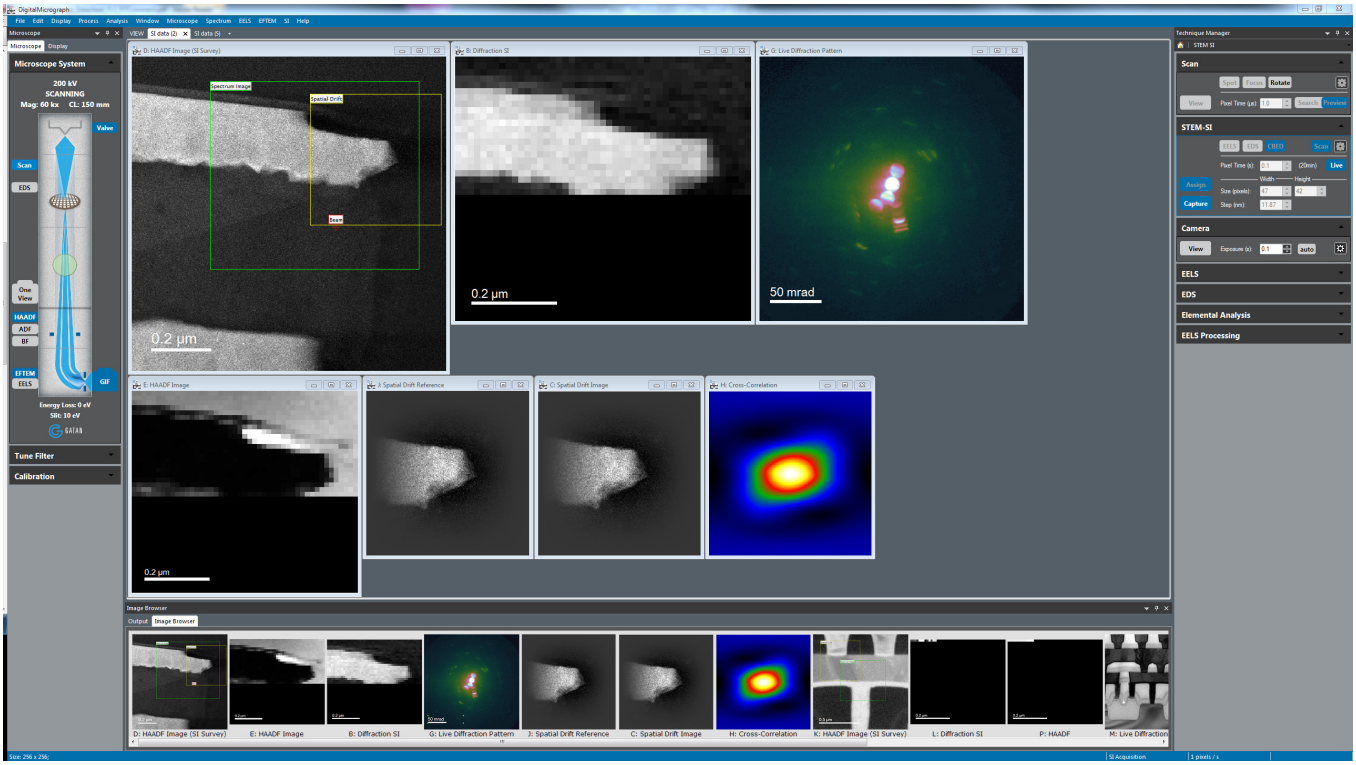

Figure 2. Screenshot of STEM DI acquisition in progress. Spatial drift correction is enabled, and the ADF signal is being acquired simultaneously.

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