Electron Dose Control Module

Control dose as quickly and easily as changing the image focus

New scientific challenges require diverse samples to be investigated with transmission electron microscopy. The capability to easily set and automatically track the appropriate electron dose saves time while ensuring reproducibility and data consistency.

Accurately set the dose where it is important at the specimen

Electron Dose Control (EDC) from Thermo Fisher Scientific is an optional control module for Thermo Scientific™ Spectra™ Transmission Electron Microscopes (TEMs) equipped with an extreme cold-field emission gun (X-CFEG). With EDC, you can:

- **Know** the electron dose and dose rate during operating conditions in order to optimize them for your sample and application
- **Document** the electron dose and dose rate along with other data for advanced quantitative analysis
- **Reproduce** data and ensure consistency

EDC can reproducibly set and recall electron dose and dose rate. Live predictions, based on the microscope optics, are shown and documented in the image metadata, so you no longer have to note down dose parameters. The dose can be set without knowledge of the TEM optics, making it easier to operate the TEM. The dose prediction is calibrated with the built-in Faraday cup, ensuring reliability. Velox Software displays beam current and converts it into dose and/or dose rate depending on the acquisition settings. Images can be exported with the relevant electron dose parameters in the data bar, saving time during reporting and making it easy to present microscope data in a meaningful way.

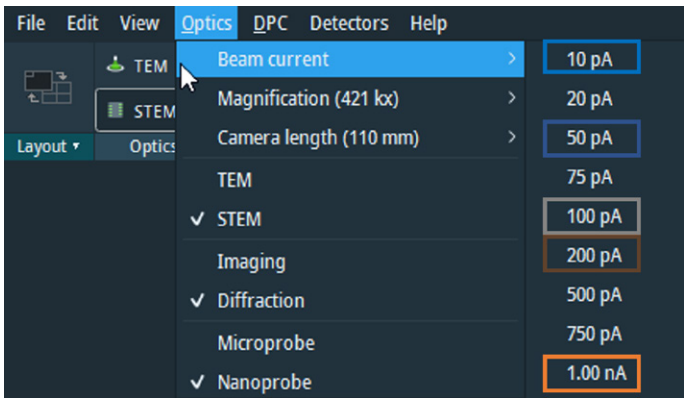

Figure 1. Beam current selection menu. The Electron Dose Control menu gives you accurate control over the beam current and dose to be delivered to the specimen.

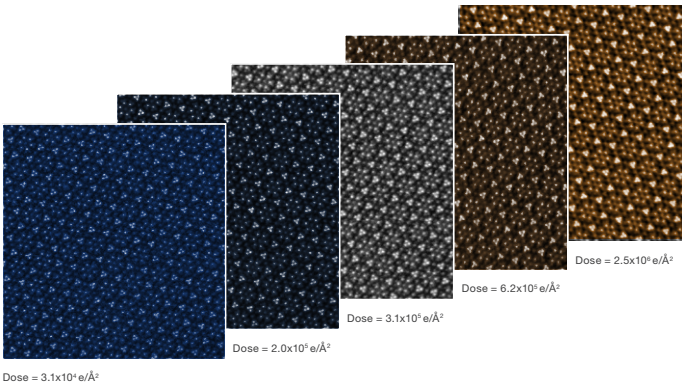

Figure 2. A garnet specimen ($GdGaO_3$ <111>) imaged with high-angle annular dark field (HAADF) detector at 300 kV with an X-CFEG. EDC tracks the dose at the specimen over a large dose range. Optimum imaging conditions, magnification, number of pixels, and dwell time are all maintained throughout the experiment.

Set and track dose over order-of-magnitude and high-tension changes

EDC leverages the reproducible, constant power optics and precise stacking of condenser lens modules on Spectra platforms to accurately predict STEM electron dose while the microscope optics are adjusted over their full range, and even during high-tension changes.

When dose is adjusted over a wide range, EDC ensures that you don't have to keep writing down changing experimental parameters, allowing you to focus on your experiments. The material-dependent electron dose limit can be determined easily by acquiring a dose series; it can subsequently be set or recalled to maximize success rate when investigating challenging samples with different dose requirements (i.e., beam-sensitive materials).

Different TEM modalities like imaging, diffraction, and spectroscopy have different dose requirements. EDC ensures quick and easy switching between different optical settings in order to maximize your productivity.

Available on all Spectra platforms equipped with an X-CFEG

EDC is an option for all Spectra platforms equipped with an X-CFEG. The X-CFEG is a perfect match for EDC since its extreme brightness provides sub-Å probes even with >1 nA of probe current. This provides a large parameter space where the dose can be flexibly set and tracked in line with the dose limitations of the specimen in order to maintain high spatial resolution.

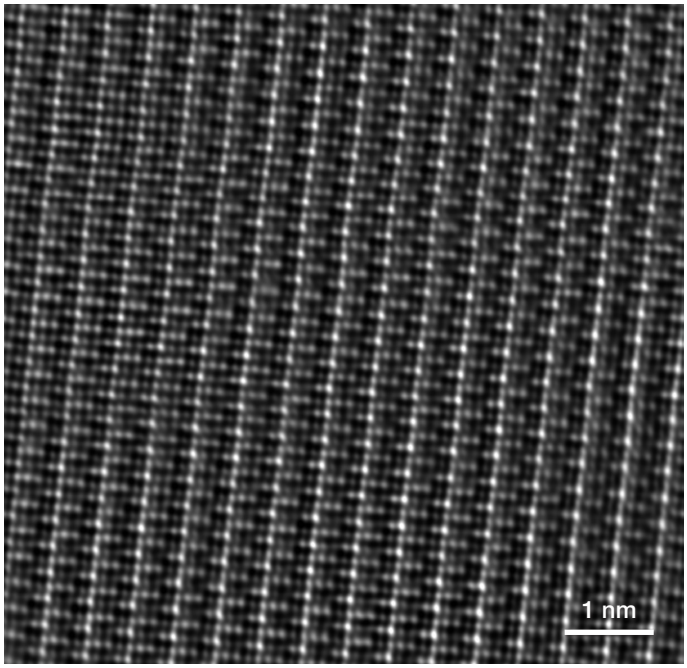

Figure 3. Li Co Oxide (LMO).

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