Experiment Brief

eaSI EDS

Title

Live EDS mapping in DigitalMicrograph with Elite T Super

Gatan Instrument Used

eaSI™ is an exclusive technology from Gatan that delivers the most **efficient** and **effective** workflow for advanced STEM experiments. eaSI leverages **Elite T Super** detector (EDAX EDS Powered by Gatan) to maximize collection efficiency and the **DigitalMicrograph**® software, a workflow-based interface for the shortest time to results.

Background

Samples with complex chemistry and architecture, like 3D NAND memory, require detailed characterization to confirm their structure or identify failure methods. EDS elemental mapping is useful for analyzing semiconductor samples prepared via lengthy fabrication processes. eaSI improves the EDS data collection workflow by allowing users to display elemental map results during live EDS data collection in DigitalMicrograph. As a result, the user can confirm in real-time if the chosen acquisition conditions are satisfactory, check if the signal-to-noise in the EDS data is appropriate, and choose when a sufficient signal is present in the elemental maps to complete data acquisition.

Materials and Methods

A lamella of 3D NAND memory was prepared via FIB and analyzed at 200 keV. The specimen was loaded in a Dual-Tilt Analytical Specimen Holder (model 626). eaSI technology was used to collect EDS data in DigitalMicrograph with the Elite T Super detector. The specimen was tilted 25° for maximum EDS signal. The STEM probe current was set to 0.99 nA. Using the STEM SI technique panel, a scan size of 204 x 197 pixels with 1 μs dwell time was selected. Live EDS Mapping was enabled; this is easily done by selecting the option and choosing the elements and specific EDS peaks of interest. The Ti K, Al K, O K, N K, Si K, and W L peaks were chosen for this experiment. The acquisition was then started, with maps of the selected elements updating live in a newly created DigitalMicrograph workspace. See the video here.
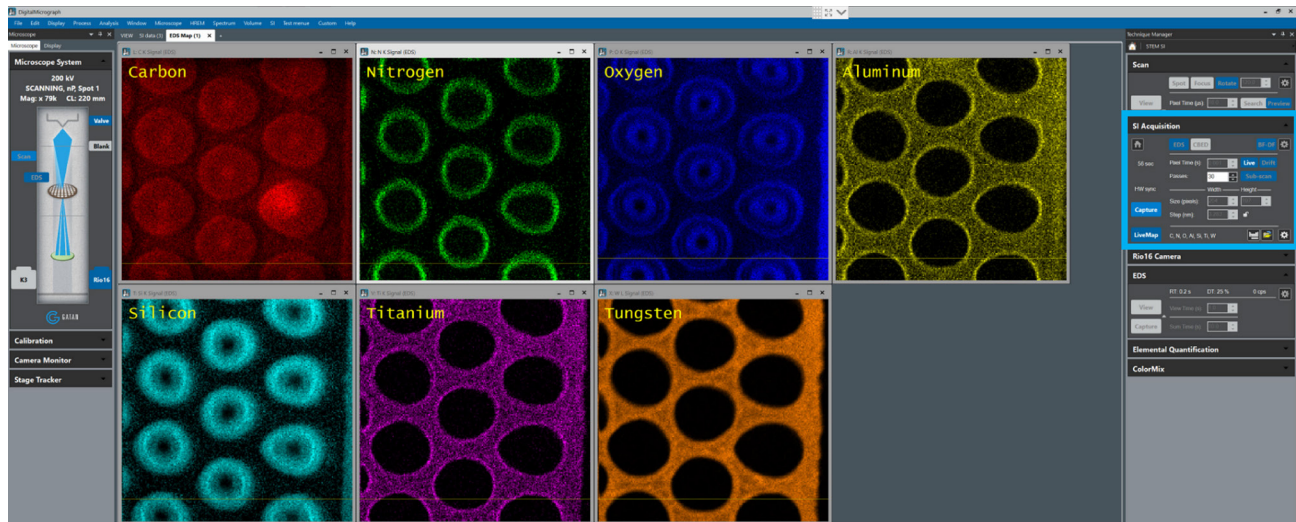

Figure 1. Live EDS mapping in DigitalMicrograph software from the 3D NAND memory sample collected with the Elite T Super detector. Field of view is 652 nm x 634 nm.

Summary

eaSI features the ability to easily collect high-quality EDS data directly in DigitalMicrograph with the Elite T Super detector. Live EDS mapping, in particular, greatly benefits the data workflow as the user gets real-time information to adjust their experiment as needed or to know when the acquisition can be stopped. In this example, the STEM SI technique in DigitalMicrograph was used to set up and acquire EDS data from several elements found in the complex structure of the 3D NAND structure. Using eaSI technology from Gatan for such experiments means further analysis, quantification, and data reporting can also be done with the built-in tools of DigitalMicrograph without transferring or converting data to a different format.

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