

Phenom ProX Desktop SEM for materials development

Real-time acquisition and elemental analysis for faster results

Graphite Machining Services & Innovations (GMSI) provides products and support for the semiconductor and LED industries. Although Peter Guercio and his colleagues at GMSI are not microscopists, they use their Phenom ProX desktop scanning electron microscope (SEM) daily for advanced materials research and development. The Phenom ProX Desktop SEM, with energy-dispersive X-ray spectroscopy (EDS), also benefits quality control of processes and products. Real-time acquisition combined with elemental analysis capabilities provides data 8x faster than before and has proven to be critical for recent product improvements.

From outsourcing to insourcing

A few years ago, GMSI was outsourcing all SEM work. This took time and resources, as samples had to be sent out for testing. About 4 years ago, GMSI brought the work in-house with a Thermo Scientific™ Phenom Desktop SEM. Suddenly, process improvements could be done faster, with no wait time for data.

GMSI uses chemical vapor deposition processes to produce SiC films on graphite for the semiconductor and LED industries. The Phenom Desktop SEM is used daily for research and development plus quality assurance of processes and products.

Advantages of using a Phenom Desktop SEM

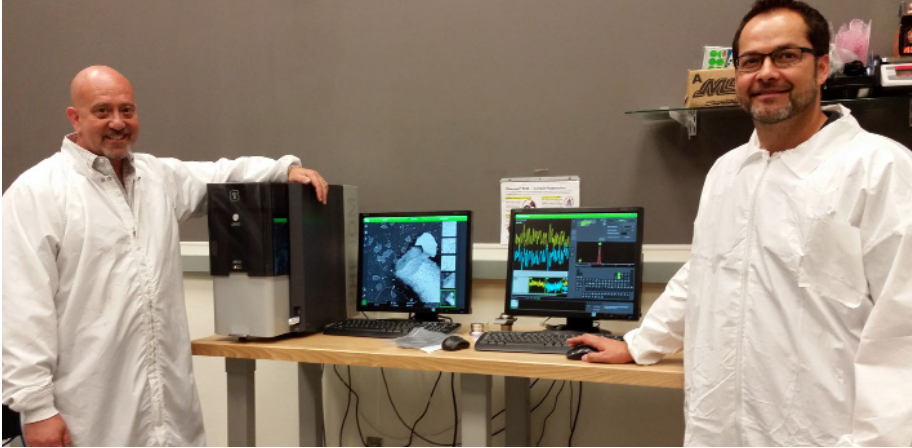
Having a Phenom Desktop SEM on site has been a huge time saver. The instrument is used to measure film thicknesses and surface morphology as a function of processing parameters. The Phenom data immediately provides critical feedback on SiC diffusion into the graphite and the crystal structure of the surfaces.

For GMSI, the ability to do correlative microscopy with the integrated camera is another important benefit of the Phenom Desktop SEM. The optical navigation is synchronized with the electron microscope image to show where defects are located, allowing quick investigation of specific areas of interest.

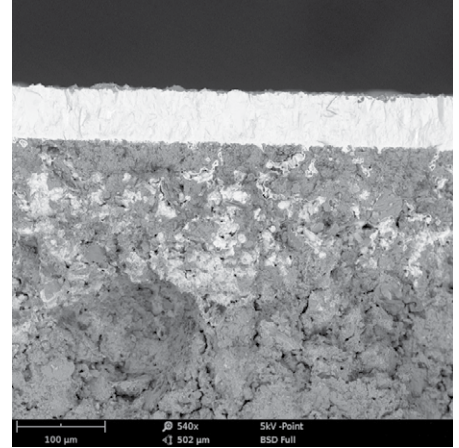
Trading up to speed up R&D

GMSI traded in their previous Phenom Desktop SEM for a Thermo Fisher Phenom ProX Desktop SEM with EDS. The higher magnification provides a full picture of every step of the process. The elemental analysis from EDS shows the elemental composition of the films, allowing GMSI to set the deposition parameters for optimum stoichiometry.

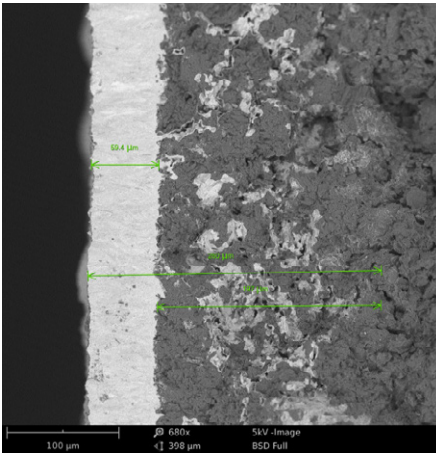
GMSI's most recent product release came to market 8x faster than expected, thanks to the real time data acquisition and elemental analysis of the Phenom ProX Desktop SEM. Peter explained, "Without the Phenom ProX Desktop SEM, we could not have developed our newest improved process. No other tool can do what the Phenom Desktop SEM does!"



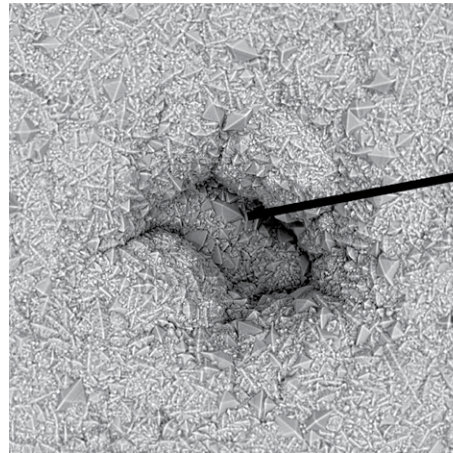
P. Guercio and P. Westphal review elemental analysis data using their Phenom ProX Desktop SEM at GMSI in Tempe, AZ.



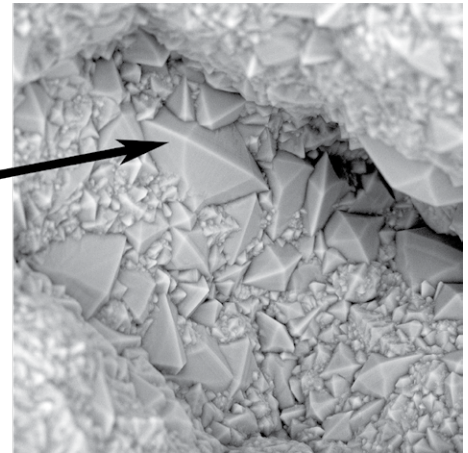
SEM image of SiC film (white layer) on graphite. Image magnification is 540x.



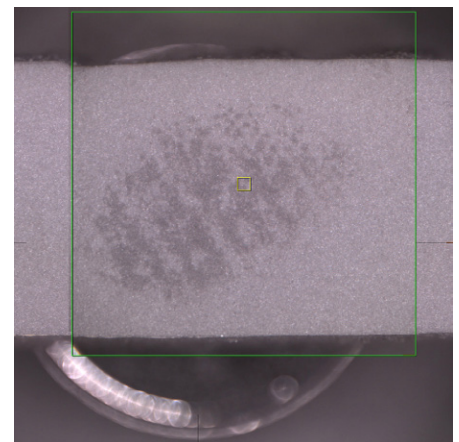
Phenom Desktop SEM image of SiC film on graphite. Backscattered electron image shows elemental contrast, indicating diffusion of SiC into the basal planes of the graphite, which prevents film delamination.



Crystal morphology is quickly observed with the Phenom Desktop SEM, showing film coverage even within defect sites. SEM image magnifications are 1000x and 3900x, left and right, respectively.



The integrated optical camera provides more than correlative microscopy; it also has QC/QA applications. For example, it is used here to show contamination transferred from a glove to the sample.



GSMI

Graphite Machining Services & Innovations, LLC. is an industry leader in the machining and manufacturing of products made from graphite and carbon. While their specialty is machining graphite, they also provide customers with a wide array of manufacturing services, such as machining plastics, composites, metals and a variety of exotic materials.

Find out more at thermofisher.com/phenom