COVALENT METROLOGY

7 Myths About Modern TEM

Myth 1

"TEM characterization takes a long time"

Reality: These days, a sample can be prepared for and analyzed with TEM in a few hours.

TEM requires specialized sample preparation that took significant amounts of time in the past. These days, this step has been accelerated dramatically with upgraded beams, detectors, and automation software on both preparatory instruments and modern TEMs.

Myth 2

"TEM gives the best resolution images"

Reality: Scanning Transmission Electron Microscopy (STEM) can also achieve atomic-level resolutions and may sometimes be a better imaging choice as it yields enhanced contrast.

STEM will often also yield better resolution images on thick or beam-sensitive samples.

Myth 3

"For elemental analysis with TEM, you have to use Electron Energy Loss Spectroscopy (EELS)"

Reality: Another method exists—Energy Dispersive X-ray Spectroscopy (EDX / EDS), and it will actually provide more accurate element concentrations.

EDX is also significantly faster and more affordable than EELS, though it provides less insight into the chemical states of the elements detected.

Myth 4

"TEM and STEM are expensive"

Reality: Due to the accelerated analysis times for modern TEMs, cost has fallen significantly. In many cases, it can be as affordable as cross-sectional FIB-SEM.

Outsource providers for S/TEM services enable engineers to access the powerful insights possible with these techniques, priced so that you only pay for what you need.

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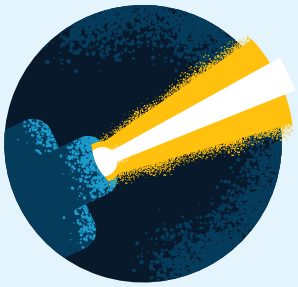
Myth 5

"Good TEM data requires a 300 kV Source"

Reality: Today, thinner samples enable even better images to be captured with lower beam energies.

The thickness of the lamella is actually what affects the contrast produced in a TEM image.

With advancements in sample preparation methods, hyper-thin lamella (20 – 60 nm thick) can be extracted. On these samples, lower beam energies will actually yield improved resolution and contrast and avoid artifacts from beam damage.



Myth 6

"It takes a PhD to understand TEM data"

Reality: Bright field TEM images can be interpreted similarly to slides under a conventional optical microscope, and EDX maps are easy to interpret.

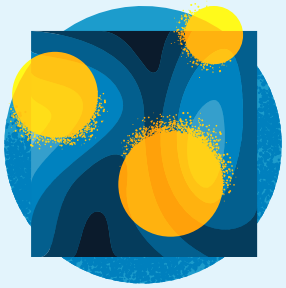
It's important to remember that contrast S/TEM data comes from sample properties other than topography, such as: atomic number, material density, and spatial phase. The dominant contrast mechanism will be governed by the imaging mode you use.

Myth 7

"Aberration correctors are needed to produce better TEM data"

Reality: These tools can definitely improve the resolution of an image, but this improvement is not always helpful.

In TEM data, resolution and contrast trade-off: when you maximize the spatial resolution of the image, you must sacrifice contrast. Ultimately, our eyes can only see the contrast.



Covalent Metrology's Instruments

Covalent Metrology uses new, cutting-edge instrumentation from Thermo Scientific to bust these myths and deliver high-quality TEM data with rapid turnaround times: our 200 kV Talos TEM is equipped with a 4k Gatan OneView camera to capture every possible detail with exquisite resolution, along with quad-EDS detectors to maximize sensitivity and accuracy for element analysis.

Get a quote at covalentmetrology.com

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