

Programmable STEM with EDM Synchrony

Control the dose at every pixel.

The Electrostatic Dose Modulator (EDM) is a fast beam blanking system with a pre-sample electrostatic deflector, including electronics and software control. EDM can also attenuate electron illumination without affecting imaging conditions, giving TEM and STEM users more control over the dose on their samples.

The optional **Synchrony upgrade** takes EDM's timing and synchronization capabilities to the next level. Synchrony can coordinate with a STEM controller, tracking the probe beam location as it scans across the sample. EDM's lightning-fast electrostatic blanking turns the beam on for a specified time at each pixel, or keeps the beam blanked to completely exclude sensitive regions from dose.

Applicable models: JEM-ARM200F (CFEG), NEOARM (CFEG), JEM-F200 (CFEG), JEM-ARM300F2, JEM-2100F (w/o Cs corrector), JEM-2200FS (w/o Cs corrector)



Synchrony Features

- Programmable dose at each STEM pixel with arbitrary patterns
- Excellent dose contrast between neighboring pixels
- Exclude dose on regions of interest with any shape
- Preview the dose pattern and align to sample structures
- Automation-friendly workflow
- Synchronize to other accessories

Synchrony Capabilities

Parameter	Available Settings	Min	Max
Pixel dwell time	Resolution 10 ns	2 μ s	167 ms
STEM resolution	Set by STEM controller	1 x 1 pixels	4096 x 4096 pixels
Gray levels	Adjust dose time in 10 ns increments	190 (for shortest dwell time)	4096 (for dwell time > 41 μ s)
STEM controller	JEOL AIP (for other STEM controllers, inquire info@ides-inc.com)		
Control interface	Software GUI, REST automation server		

Arbitrary dose patterns

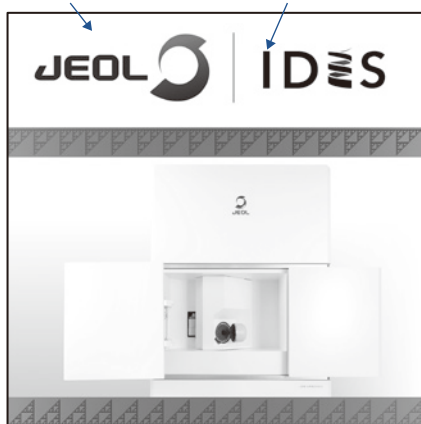
This data shows the exquisite control achieved by Programmable STEM with EDM Synchrony.

(Left) User-defined test pattern with a variety of high-resolution features. The gray level in each pixel tells Synchrony how long to expose. This test pattern was used during a scan of Au nanoparticles using a JEOL GRAND ARM™2 TEM, resulting in a modulated bright-field image (Right). The nanoparticles are clearly visible, as are the logo graphics, the test patterns, and the photograph of the TEM from the modulation image.

Images courtesy of The Rosalind Franklin Institute, UK.

**If you can draw it,
so can Synchrony**

4K x 4K scan modulation pattern
100% Illumination 0% Illumination

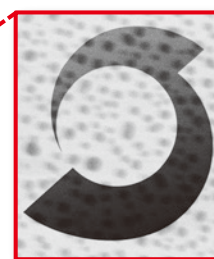


Synchrony modulates the dose based on any image you give it.

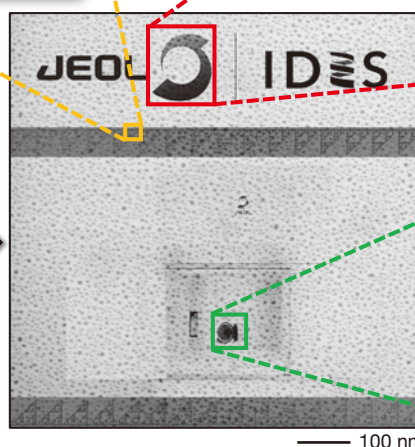
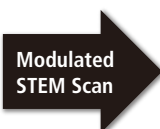


*Single-pixel-precise
fractal + checkerboard
test pattern*

*Up to 12-bit
grayscale*



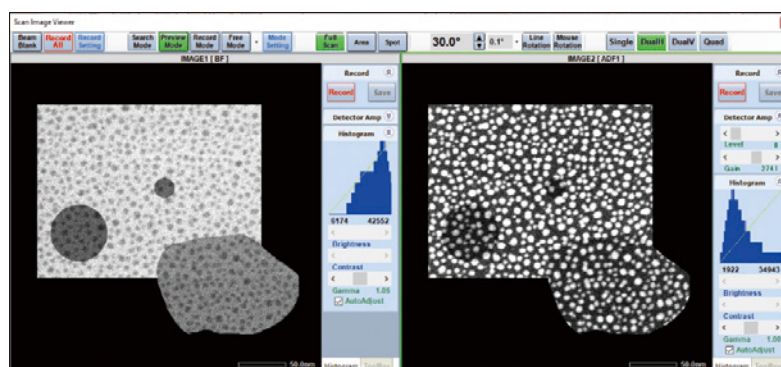
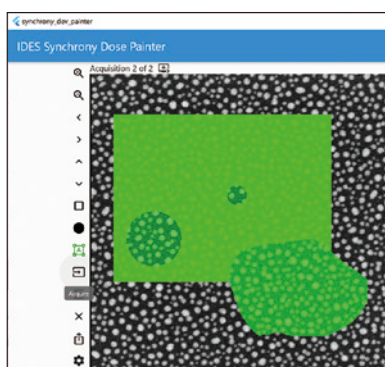
*TEM load lock from
photograph*



Unprocessed STEM data. The exposure time at each pixel is controlled by Synchrony.

Targeted dose to sample features

The user-friendly Synchrony Dose Painter software makes it possible to customize the dose pattern for each sample. **Left:** The user paints a custom dose pattern (green) overlaid with a preview image of the sample. Synchrony refers to this pattern to apply dose the sample, similar to the example above. **Right:** STEM measurement with the user's Synchrony dose pattern applied. *Images courtesy of The Rosalind Franklin Institute, UK.*



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