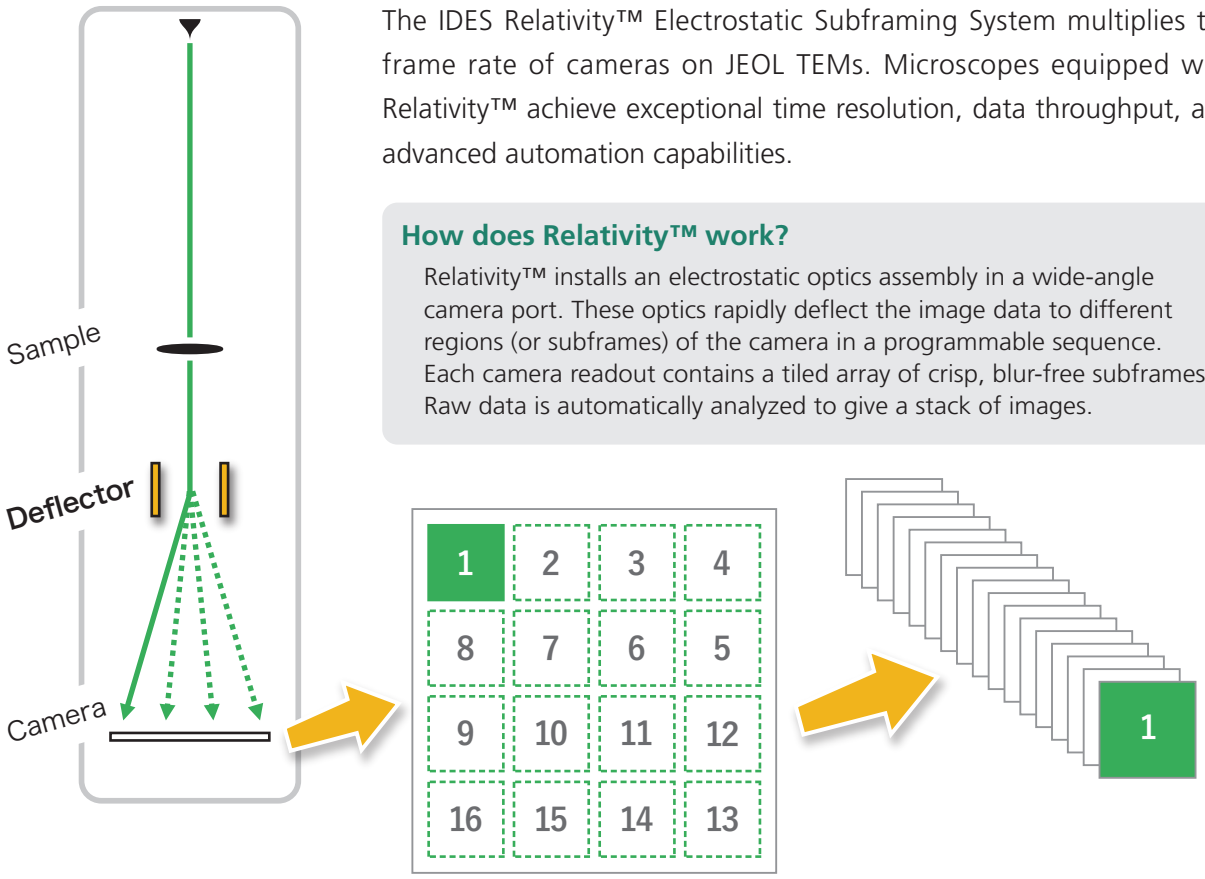
Relativity™

Electrostatic Subframing System



The IDES Relativity™ Electrostatic Subframing System multiplies the frame rate of cameras on JEOL TEMs. Microscopes equipped with Relativity™ achieve exceptional time resolution, data throughput, and advanced automation capabilities.

How does Relativity™ work?

Relativity™ installs an electrostatic optics assembly in a wide-angle camera port. These optics rapidly deflect the image data to different regions (or subframes) of the camera in a programmable sequence. Each camera readout contains a tiled array of crisp, blur-free subframes. Raw data is automatically analyzed to give a stack of images.

Features at a glance

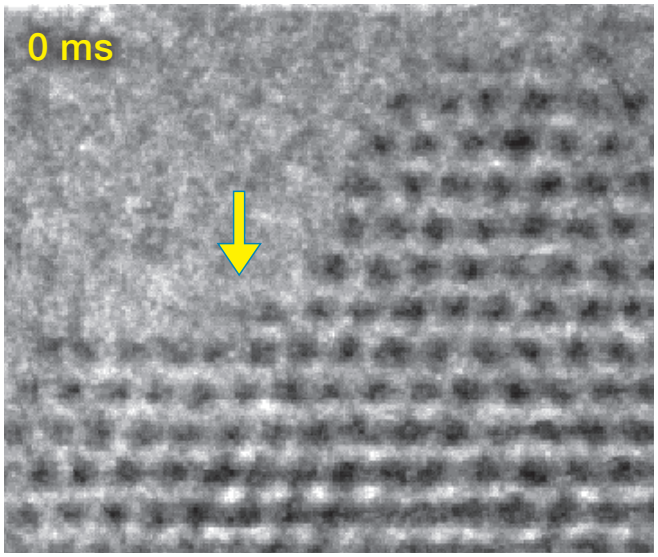
- **Time resolution:**
  Relativity™ performs transitions between subframe regions in less than 100 ns.
- **Continuous kHz-scale video:**
  Relativity™ can sustain subframe rates up to 100 kHz.
- **Custom applications:**
  Integrate Relativity™ with an in situ holder, laser, IDES Electrostatic Dose Modulator, or other accessories.
- **Simple field installation:**
  Relativity™'s electrostatic optics are installed through an side-mounted camera port.
- **Out of sight, out of mind:**
  Optics pneumatically retract out of the beam when they are not in use.
- **Acuity Edge analysis server:**
  Automated data processing with segmentation and alignment of subframes helps you get the most out of your data.
- **Advanced control software:**
  Seamlessly move between measurement programs with our intuitive interface, or use our powerful tools to design something new.

Performance

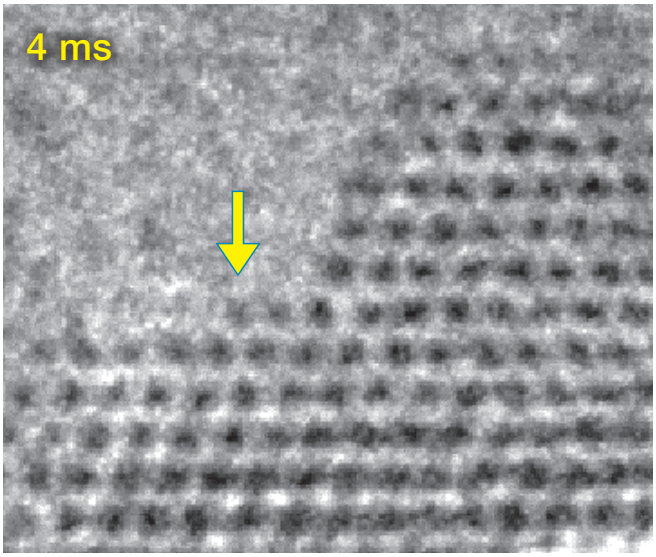
Supported camera type	Bottom mounted camera(1)
Relativity™ deflector module install location	Side-mounted camera port(2)
Maximum subframe size on camera	7 mm × 5.3 mm(3) (460 × 350 pixels(4), JEM-F200 with GATAN OneView)
Native subframe array lay out (no overlap)(5)	8 × 10 at 200 kV or lower, 7 × 8 at 300 kV (by GATAN OneView, ClearView, TVIPS XF416R) 5 × 6 (by GATAN RIO16)
Subframe array layouts(6)	5 × 7, 8 × 10, 12 × 12 at 200 kV or lower 5 × 7, 7 × 8, 9 × 9 at 300 kV (for GATAN OneView or ClearView or TVIPS XF416R) 5 × 4, 5 × 6, 8 × 8 (by GATAN RIO16)
Acceleration voltage(7)	40 kV or higher (by GATAN OneView, ClearView, TVIPS XF416R) 80 kV or higher (by GATAN RIO16)
Auxiliary logic outputs Quantity Sample rate	 4 × TTL-compatible outputs 100 MS/s (MS: mega sampling)
Trigger input	2 × TTL-compatible input

(1) Continuous frame recording feature (GATAN IS mode, TVIPS in-situ package etc,) is strongly recommended.
(2) In the JEM-2100Plus, Relativity™ deflector module is installed in the left-side STEM detector port.
(3) The subframe size is limited by the spacing between deflector electrodes (the "deflector gap"). Detailed information is available in the specification sheet of Relativity™.
(4) Subframe size depends on TEM and bottom mounted camera. Please ask IDES if needed.
(5) Layout depends on TEM and bottom mounted camera. Please ask IDES if needed.
(6) Due to geomatical constraints, different subframe array layouts are optimal for different detector sizes.
Relativity™ system is compatible with nearly all commercially-available cameras. Please ask IDES if another camera is configured.
(7) Corresponding acceleration voltage depends on TEM and camera. Please ask IDES if TEM has another camera.

Applicable models: JEM-ARM300F/300F2, JEM-ARM200F, NEOARM, JEM-F200, JEM-2100Plus



Frame 3 (1.63-2.45 ms)



Frame 8 (5.71-6.53 ms)

This data shows TEM images of a CeO_2 surface acquired with 0.82 ms exposure time.
As shown in the TEM image on the right, the Ce atoms have migrated after 4 ms.
(Instrument: JEM-ARM300F2, Accelerating Voltage: 300 kV)
Sample courtesy of Johnson Matthey, UK

IDES INC, 4670 Willow Road, Suite 100, Pleasanton, CA 94588, USA www.ides-inc.com

JEOL Ltd.
3-1-2 Musashino Akishima Tokyo 196-8558 Japan Sales Division Tel. 81-3-6262-3561 Fax. 81-3-6262-3577
www.jeol.com ISO 9001 • ISO 14001 Certified

▼ Local office

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