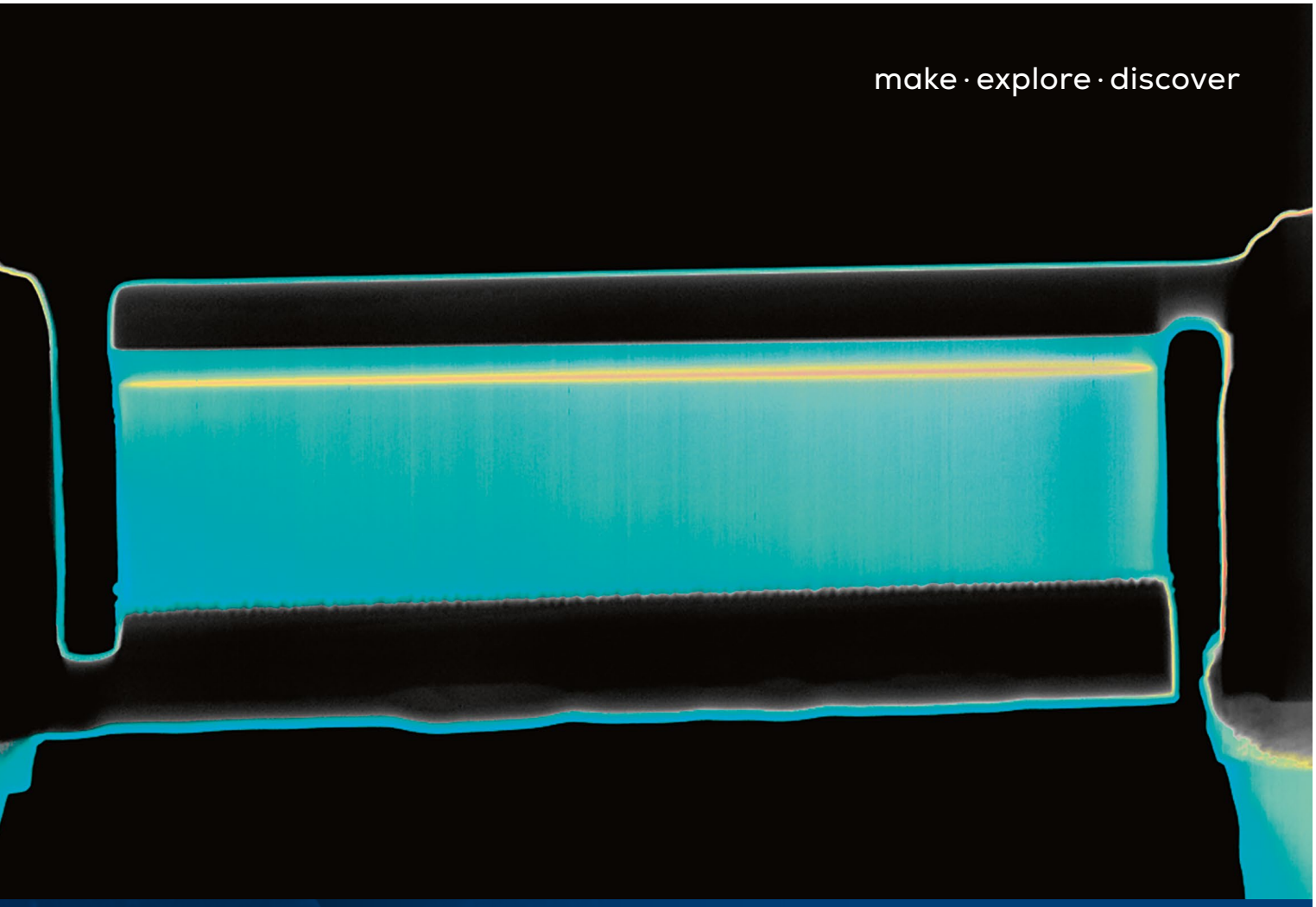
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Electrical Analysis for TEM

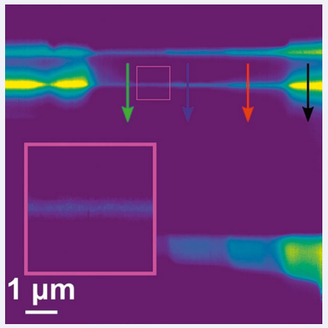
In-situ imaging of electrical activity at the nanoscale

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Electrical activity and high-resolution data

The Electrical Analysis system brings all current collecting techniques, including EBIC, SEEC, RCI, and EBIRCH to the STEM. It enables precise, high-quality visualization of electronic properties and defects.

Advanced features include ultra-fast multi-channel imaging, live-color mixing, quantitative signal processing, and integrated lock-in EA - to ensure rapid, intuitive analysis and to maximize application versatility.

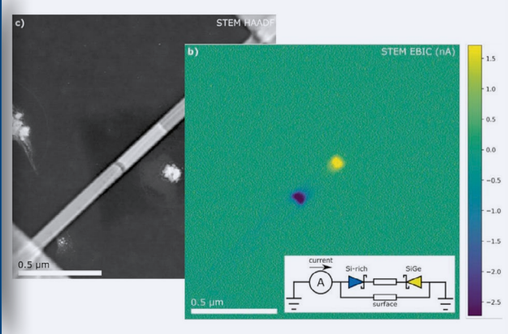


EBIC TECHNIQUE

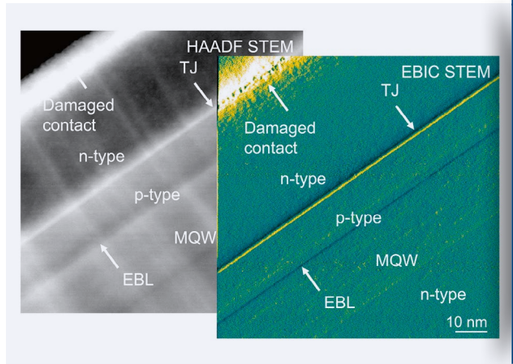
Add the Electron Beam Induced Current (EBIC) technique to TEM, and understand structure–function relationships, analyze device behavior and gain direct electrical data.

ELECTRIC FIELDS IN NANODEVICES

Map device junctions and contacts, validate doping profiles against design, and correlate with device model and parameters.



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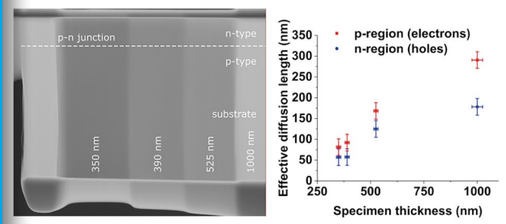


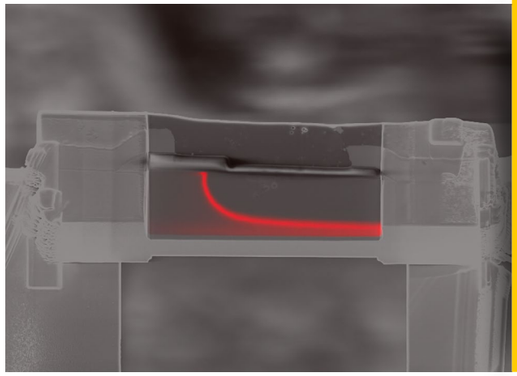
LAYER-ANALYSIS OF COMPLEX DEVICES

Reveal electrical activity of each layer to identify sites with increased recombination, distinguish electrically active defects from inactive ones, and refine analysis with high-resolution techniques.

FUNDAMENTAL PARAMETERS

Measure fundamental parameters including diffusion lengths, depletion width at junctions and recombination strength of dislocations.





FIB-SEM SAMPLE SCREENING

Apply standard FIB workflows for in-situ biasing and use wide field-of-view of EA in SEM to select target.

Integrated and easy-to-use quantitative software

CUSTOMIZABLE WORKFLOW

Configurable buttons and scan settings, including fast scan for alignment, high-resolution EA profile for analysis, and simultaneous EA scan for localization

FLEXIBLE CHANNEL ROUTING

Easy distinction between SEEC, RCI and EBIC signals through software controlled channel routing

INTEGRATED AMPLIFIER CONTROL

Software integrated, complete control of all amplifier functions, including routing, calibration, gains, offsets, bias and compensation. Auto time filter matches scan speed

DIRECT CORRELATION

Simultaneous acquisition of Electrical Analysis with up to 20 further detector signals, live signal mixing and processing tools

INTEGRATED CURRENT-VOLTAGE SWEEP TOOL

Configurable range, points, and timing to verify electrical connections and inspect for beam damage

MICRODIP PROCESSING APP

Full image and metadata viewer with automated quantification, gradient-based pseudo-colors, color-mix of pages for visualization and quantitative pixel values

EA amplifier control | EA, HAADF and BF image acquisition | Live image color-mix tool
Automated quantification | Current-voltage sweep tool | Standard file formats

Turn-key solution for in-situ EA

As a complete solution, all electronics are fully integrated and controlled via software.



Quantitative electronics for electrical analysis

EA amplifier | REVOLON scan controller
Display panel | Control app

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EA AMPLIFIER OPTIONS FOR BIASING HOLDERS

First stage low-noise analog amplification with a wide gain range, built-in voltage bias and current compensation, automated signal routing and zero adjustment, and switchable low-pass filters



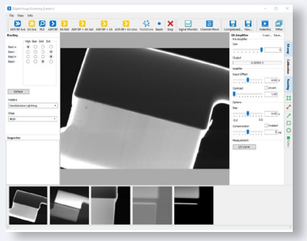
REVOLON

External TEM scan controller and imaging system for highest speed for in-situ STEM, large pixel resolution, second stage digital amplification for EA, and with simultaneous BF, HAADF and EA inputs



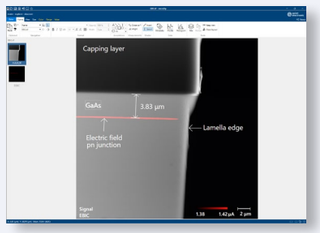
DISPLAY PANEL

Hardware control panel with touch display and encoders for easy, fast and precise software control



CONTROL APP

Image acquisition and amplifier control, with color mixing, current-voltage (IV), line scans, inspection and export functions of calibrated image data



MICRODIP APP

Image and metadata viewer with automated pixel value quantification, color palette, signal mixing, line profile extraction and measurement of diffusion length

EA electronics for in-situ biasing holders

Input channels	x8 to DENSsolutions in-situ biasing holder, or
	x4...6x to Protochips in-situ biasing holder
Routing	For all channels independent routing to either preamp, biasing, ground or direct output to external devices
Pre-amplifier	10^4 … 10^9 V/A variable gain
	Approx. 100 kHz bandwidth at 10^7 V/A
Digital main amplifier	-0.5V...0.5V input offset
	1....3600 contrast
	Signal inversion
Internal sources	-5 … 5 V, 16-bit bias voltage
	-1 ... 1 µA, 16-bit compensation current
	10 µA, 30 µA and 100 µA bias current limits

REVOLON scan controller

Signal inputs	1x calibrated EA
	4x STEM
Digitization	20-bit EA, saved to 16-bit, 1 Msps
	12-bit STEM, saved to 16-bit, 100 Msps
Scan generator	X and Y scan outputs (calibrated)
	Beam blank output (optional)
	64k × 64k pixels maximum resolution
	0.5 GPixels maximum frame size (software limit)
	1 µs minimum pixel dwell time (EA input limit)
Synchronization	Pixel, Line and Frame trigger outputs
	10ns.... 100ms trigger lenghts
	Pixel, Line and Frame trigger inputs

Display panel

Configuration	Panel interaction with software interface via events and actions
Display	Display 480 x 800 px (4.3“)
	Resistive touch
Encoders	4 encoders
	360 increments per revolution
	Beeper and vibration motor for haptic and acoustic feedback
Housing	Sturdy metal housing for stability
Interface	USB interface for control and power

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Control app

EA amplifier	Gain, Contrast, Brightness, Bias, Compensation, Inv.
	Save/load amplifier profile
Scan controller	Configurable scan profiles
	Signals, pixel resolution, speed, averaging, sync
	Manual/automatic image range
Inspector tool	Automatic quantification of pixel values
	Editable formula files
Current voltage (IV) tool	Voltage range, steps, time
	Live plot with data and graph export
Image mixing tool	Manual colour assignment
	Live mix with image export
Save file formats	Uncompressed 8-bit or 16-bit multi-page TIF
	Compressed JPEG
	XMP metadata embedded into TIF and JPEG
Operating systems	Windows 11 … 7

microDIP app

Input file formats	Uncompressed 8-bit or 16-bit multi-page TIF
	Compressed JPEG
	XMP metadata embedded into TIF and JPEG
Export file formats	PNG images
	CSV data with pixel values
View modes	Single page image and metadata
	Multiple pages/file
	Layers/image mix view
Quantification	Automatic, using XMP values and formulas
	Manual, using XML formulas
Pseudo-colour	GGR gradient based colour mapping
	Automatic and manual control of range
Annotations	Lables, arrows, lines, rectangles, circles
Measurements	Distances, angles
	Line profile
	Histogram
Operating systems	Windows 11 … 7

Parts and Cables

EA biasing holder electronics	Standard	1x
REVOLON TEM Scan Controller	Standard	1x
EA biasing holder cable	Standard	1x
EA ground strap	Standard	1x
TEM signal cable	Standard	1x
TEM external scan interface cable	Standard	1x
USB cable	Standard	1x
USB memory stick with software	Standard	1x
Display panel	Optional	1x
EA reference sample	Optional	1x
PC, keyboard, mouse	Optional	1x
Display	Optional	1x

Software packages

Drivers	PEUSB
Libraries	DISS6 Control
Software	Control app
	microDIP app
	EMGateway server

Weight & Dimensions

EA biasing holder electronics (Protochips)	66 mm length typ.
	60 mm diameter
EA biasing holder electronics (DENSsolutions)	9.5 x 4.2 x 2.3 cm
REVOLON	64 x 8.7 x 29.5 cm
	3.4 kg
Display panel	20 x 15.5 cm
	0.9 kg
Shipping	typ. 64 x 32 x 56 cm
	typ. 7.5 kg

Site requirements

Power	1x mains 110/220 VAC single phase 50-60 Hz
	on the same earth as the microscope
Microscope	1x biasing holder (see compatible models)
	1x external scan interface
	1x video connection (HAADF prefered)
	1x microscope ground
Space	EA electronics must be mounted on the TEM in-situ biasing holder
	REVOLON may be placed in a TEM electronics rack

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Our design principles

We look back on 30 years of experience in development and manufacture of high-performance instruments and technologies for microscopy.

We are driven by an ambition to expand abilities and to improve performance of electron microscopes.

Our aspiration is to make the best quality tools and to join our customers on their journeys of scientific exploration and discovery.

Performance
Microscopy must be a reliable and enjoyable experience
- Design for highest speed and resolution at the lowest noise
- Develop smart independent controllers for live optimization
- Support new users with simple and automated controls
- Assist advanced users with access to all parameters

Efficiency
Microscopes must provide an uninterrupted focus
- Use standard microscope controls and data formats
- Give instant feedback with live image mixing and processing
- Add bespoke software tools and algorithms for repetitive tasks
- Enable more developers with libraries and documentation

Environment
Products and technologies must be sustainable
- Reduce power consumption through smart design
- Minimize material use, embrace reuse where possible
- Save weight and volume for shipping and maintenance
- Enable everyone to develop sustainable innovations

Quantification
Data and control must be in physical units
- Calibrate, in production, for measured inputs and outputs
- Provide samples, procedures and software for calibration
- Give all control parameters in device independent values
- Ensure safe operation according to IEC61010-1 and IEC 61326-1

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