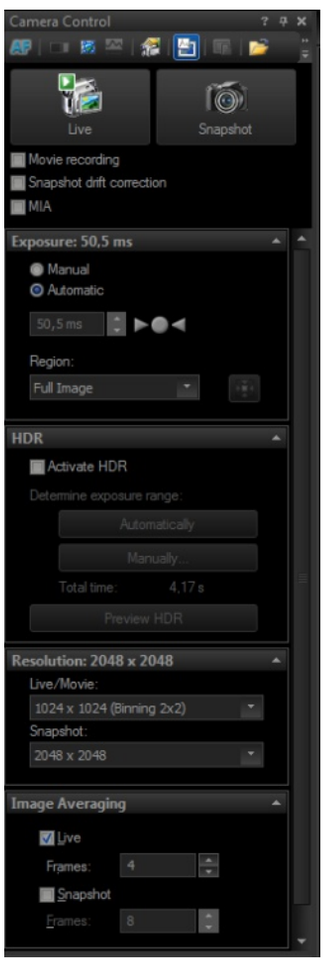
RADIUS - Acquisition, Imaging & Control Software

RADIUS - The way forward in electron microscopy

ONE SOFTWARE FOR CONTROL

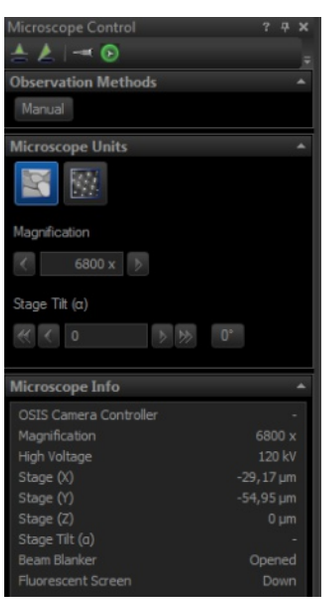
Camera control

RADIUS and our TEM cameras are matching perfectly. It is extremely simple to capture perfect, detailed images with RADIUS. The clearly structured camera control dialog is characterized by an intuitive operation. In live mode, there is direct access to all the important camera functions, such as exposure times, resolutions, camera change and averaging. Every setting change is executed„on-the-fly". If required, numerous extra real-time functions such as online histogram, live shading correction, automatic sharpness filter or automatic exposure control can be switched on. If live image averaging is combined with intelligent offline drift correction, outstanding images can be obtained even from specimen which are otherwise difficult to visualize. The digital zoom using the mouse wheel allows rapid checking of sharpness and resolution in the live image before the image is finally captured.



Microscope control

The integration of electron microscopes in RADIUS is unique. As with camera control, the user has direct access from RADIUS to the motorized and controllable components of modern (and in some cases older) electron microscopes. Depending on the remote control capability of the electron microscope, it is possible to switch the beam blanker and the shutter, to set enlargement, to switch between normal bright field imaging and diffraction mode or to use microscope alignment. All the microscope parameters which can be read out are automatically included and clearly presented. The implementation of microscopes in RADIUS expands both application potential and spheres of application to a huge extent, guarantees outstanding precision and reproducibility and ensures efficient working. For electron microscopes without remote control capability, RADIUS provides manual microscope control. Enlargement and high voltage data are interrogated automatically and used to calibrate the images captured.



Stage control

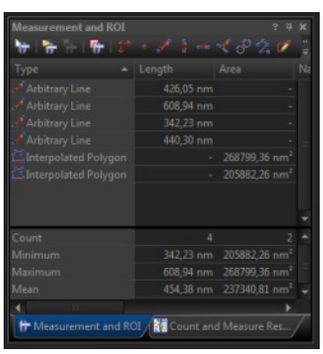
RADIUS also controls the motorized stages and image shift of the electron microscopes. This makes it perfectly straightforward to record high-resolution panoramas automatically. Integrated navigation functions help the user find his or her way easily around the large (often huge) images.

PROCESS AND ANALYSE DATA

Image processing

RADIUS includes a variety of advanced image processing techniques. These include sophisticated filtering methods and efficient arithmetical filter techniques. As a consequence, two images can be added to amplify the signal at low intensities or e.g. two images subtracted to visualize differences (DCE filter). Other filters include sharpness, edge detection, offline flatfield correction, etc. All filters are controlled from within one central user interface with convenient and fast preview possibilties.

Additional to that RADIUS provides the full set of Fourier space operations, including filters and filtered image preview, which can be done in live as well as in existing images.



Interactive measurements

RADIUS provides a variety of options for measuring and dimensioning. Intervals, angles, rectangles, circles, ellipses and polygons can be determined interactively. Orthogonal lines support the user. The measurement data are stored with the image and listed in a table. RADIUS can be expanded by high-performance multi-phase analysis including object counting, which can be restricted to regions of interest (ROIs). An automatic threshold value algorithm ensures rapid results. The result of multi-phase analysis is in each case the absolute and percentage value for area, proportion of area and number of objects.

Object detection and classification

Object analysis delivers highly detailed information about specific image elements. RADIUS can be expanded by a unique detection process. RADIUS Solution Detection uses a new kind of dynamic threshold value method to separate objects – immunogold markers, for example – from the background. In order to be able to deal with the variable issues and often very different types of particle, object classification provides over 50 different parameters for geometry (shape, size, position) and pixel properties (intensity, gray value). These parameters can be linked together using logical and arithmetical operations to define specific object classes. The software outputs these data in tabular form and compiles object class diagrams. (*)

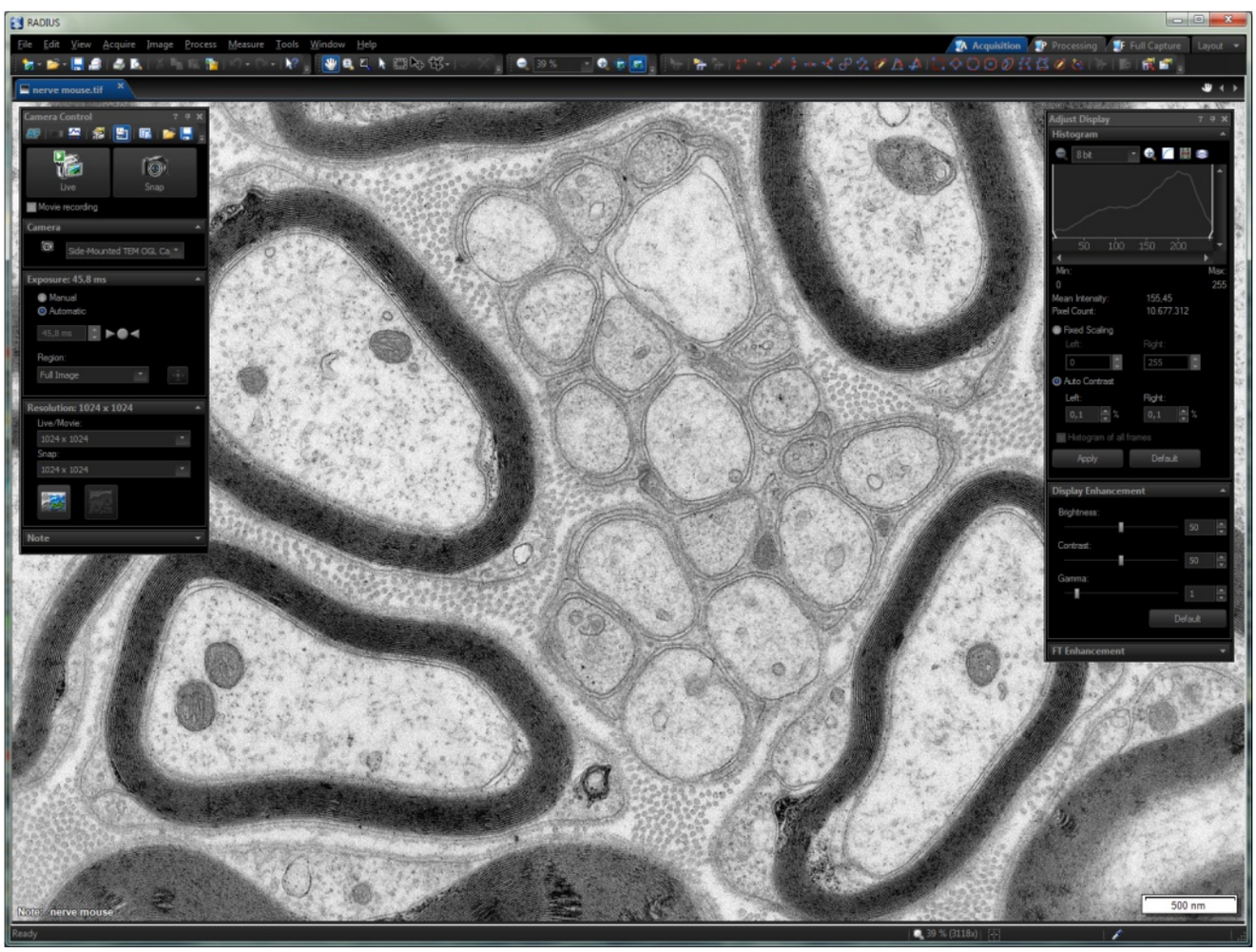
(*= may require other EMSIS GmbH products, some of which may be chargeable and may not be included in the normal RADIUS scope of supply).

ARCHIVING YOUR DATA

Structured data filing

The quantity of data increases with every image recorded. This leads to greater requirements and demands being placed on archiving and search routines, as well as on data security.

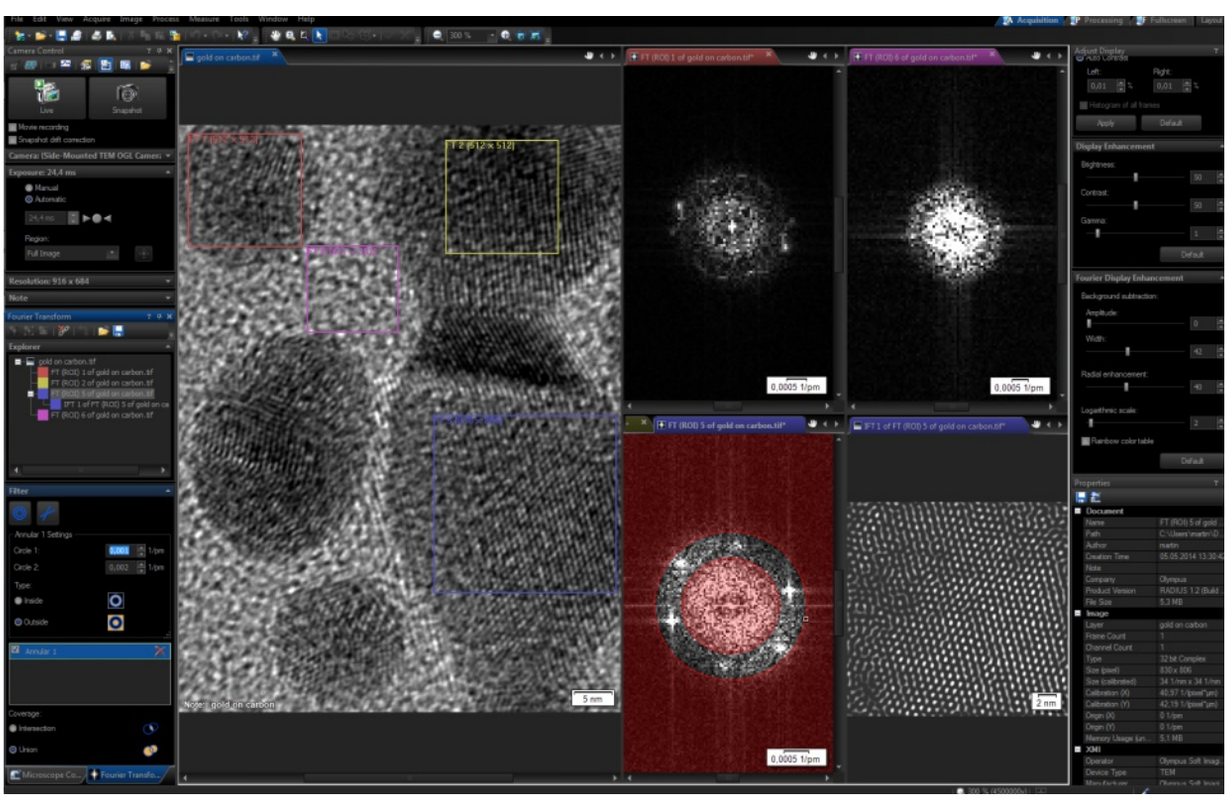
RADIUS provides a easy-to-use and convenient file management. RADIUS not only provides you with EM software for smooth recording and analysis processes, but simultaneously with versatile and likewise simple-to-operate solutions in the sphere of archiving.



AND MORE...

Give your creativity free rein when continuing to edit your images and data. RADIUS provides you with a wide variety of options for this. Provide your images with explanatory annotations, edit the images and data using the numerous integrated filters, measure your images or analyze them automatically. Virtually all the functions can also be used in live image mode.

A special type of analysis and filtering is integrated Fourier trans- formation. Intelligent use of modern PC architecture completely eliminates the old 2n limitation of FFT: Fourier analysis can be made in any rectangle you like with RADIUS, almost without size restriction and with full functionality in the live image. Any change is shown immediately, not only in the reciprocal image, but also in the filtered image. Up to four ROI (region of interest) rectangles can be defined simultaneously.RADIUS includes numerous interactive one and two-dimensional measuring functions, as well as variable line profiles which are avail- able to the user in both the live image and in the saved image. The measuring results are displayed in live overlay and can be exported directly for further evaluation.RADIUS can be expanded in many areas, for example in the automatic analysis of images and series of images. The RADIUS Solution Detection add-on permits complex object analyses - in immunogold staining applications, for example - to be performed quickly and intuitively.



Example of RADIUS user interface, showing the use of the Fourier analysis and transformation, including different ROIs and filtering.

TEM CAMERAS

EMSIS side-entry cameras

EMSIS supplies a comprehensive portfolio of side-mount TEM cameras, compatible to almost all transmission electron microscopes – from legacy models to the most modern ones. Each of these is fully integrated in RADIUS.

The side-entry models fit to a single 35mm side entry port of a TEM and provide with their patented rigid mechanics and their custom made high quality lenses an always focused and image.

MEGAVIEW G3

Low priced, high speed TEM camera

- 2,8 megapixel
- 55 frames per second in full resolution
- 160 frames per second maximum speed
- Patented rigid mechanics

VELETA G3

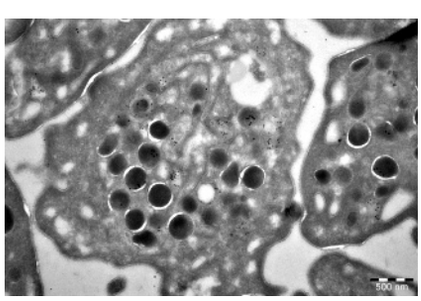
Mid-range fast 4 megapixel TEM camera

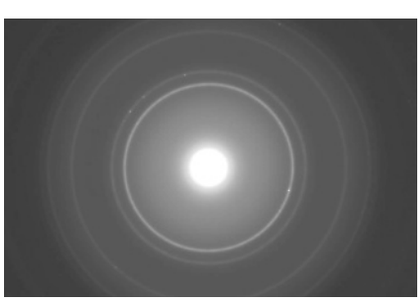
- 4 megapixel
- 30 frames per second in full resolution
- 70 frames per second maximum speed
- High sensitivity and signal to noise ratio

PHURONA

Versatile 12 megapixel CMOS TEM camera

- 12 megapixel
- 20 fps in full 12 MP, up to 50 fps in 2x binning
- high contrast and high sensitivity
- CMOS image sensor





TEM CAMERAS

EMSIS bottom-mount cameras

EMSIS supplies a comprehensive portfolio bottom-mount TEM cameras, compatible to almost all transmission electron microscopes – from legacy models to the most modern ones. Each of these is fully integrated in RADIUS.

The bottom-mount models fit to the bottom on-axis port of a TEM and exhibit a smart and small footprint rigid. Their tapered fiber optics provide highest quality, no distortion and secure highest resolution and sensitivity.

TENGRA

Mid-range TEM CCD camera

- 5 megapixel
- High sensivity
- Adapted for low budgets

QUEMESA

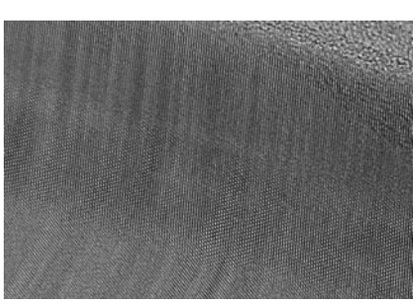
Versatile high-resolution TEM CCD camera

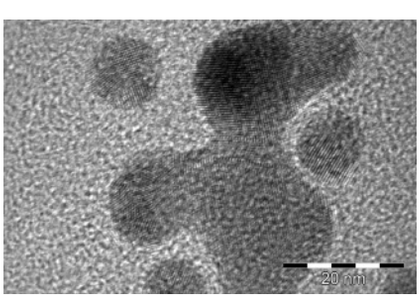
- 11 megapixel
- Perfectly adapted scintillator and pixel size
- High resolution, high sensitivity

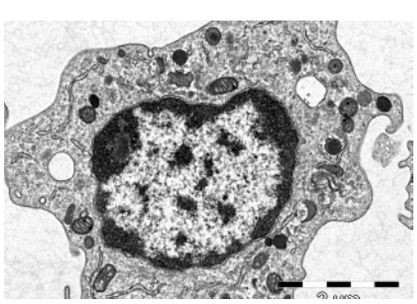
XAROSA

High-end 20 megapixel CMOS TEM camera

- 20 megapixel
- 30 fps in full 20 MP
- more than 100 fps in binning
- CMOS image sensor
- fast Thunderbolt data interface







RADIUS 2.0 Specifications

Functional Group	Features
Acquisition	Standard and enhanced live and snapshot functions
	Smart exposure
	Smart live image averaging
	Sharpness filter (live / snapshot)
	Smart drift correction
	Movie acquisition, Video recording and streaming
	Automatic calibration of bright field and diffraction images
	Online histogram
	Live line profile with averaging
	Information stamp
	High-dynamic range images (HDR)
Device control	Multiple Image Alignment (MIA)
	TEM alignments (autofocus, stigmator, eucentricity, coma-free)
	TEM control (magnification, goniometer, stage, image mode...)
	“Click-to-center”
	Virtual EM control for legacy EMs providing no remote control capabilit
Image processing	Image navigator and gallery
	Full set of image filters with extended preview
	Morphological filters* (with RADIUS Solution Detection)
	Image geometry
	Interactive measurements - real and reciprocal space
	Export of measurement results (txt, csv)
	Measurement assistance for diffraction patterns
	Line profile with averaging
	Image layers
	Automated particle detection and analysis* (with RADIUS Solution Detection)
Fourier analysis	Fourier analysis both in live and offline images
	Discrete and Fast Fourier Transformation
	Multiple ROIs, and arbitrary rectangular (DFT/FFT)
	Line profile in Fourier space
	Filtered and inverse Fourier transformations dynamically linked with ori
	Filtering in Fourier space (band pass, sector, blob, lattice)
Image export	Automatic image naming
	Annotations: text, arrows, misc. labels
Archiving	Document Storage
Macros	Macro recording
Miscellaneous	Windows 7 (64-bit) and Windows 10 (64-bit)
	Different layouts user definable
	Expandable via Solutions*
	Dark application skin
	License key file based software protection

(*= require other EMSIS GmbH products, some of which may be chargeable and not be included in the normal RADIUS scope of supply)

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