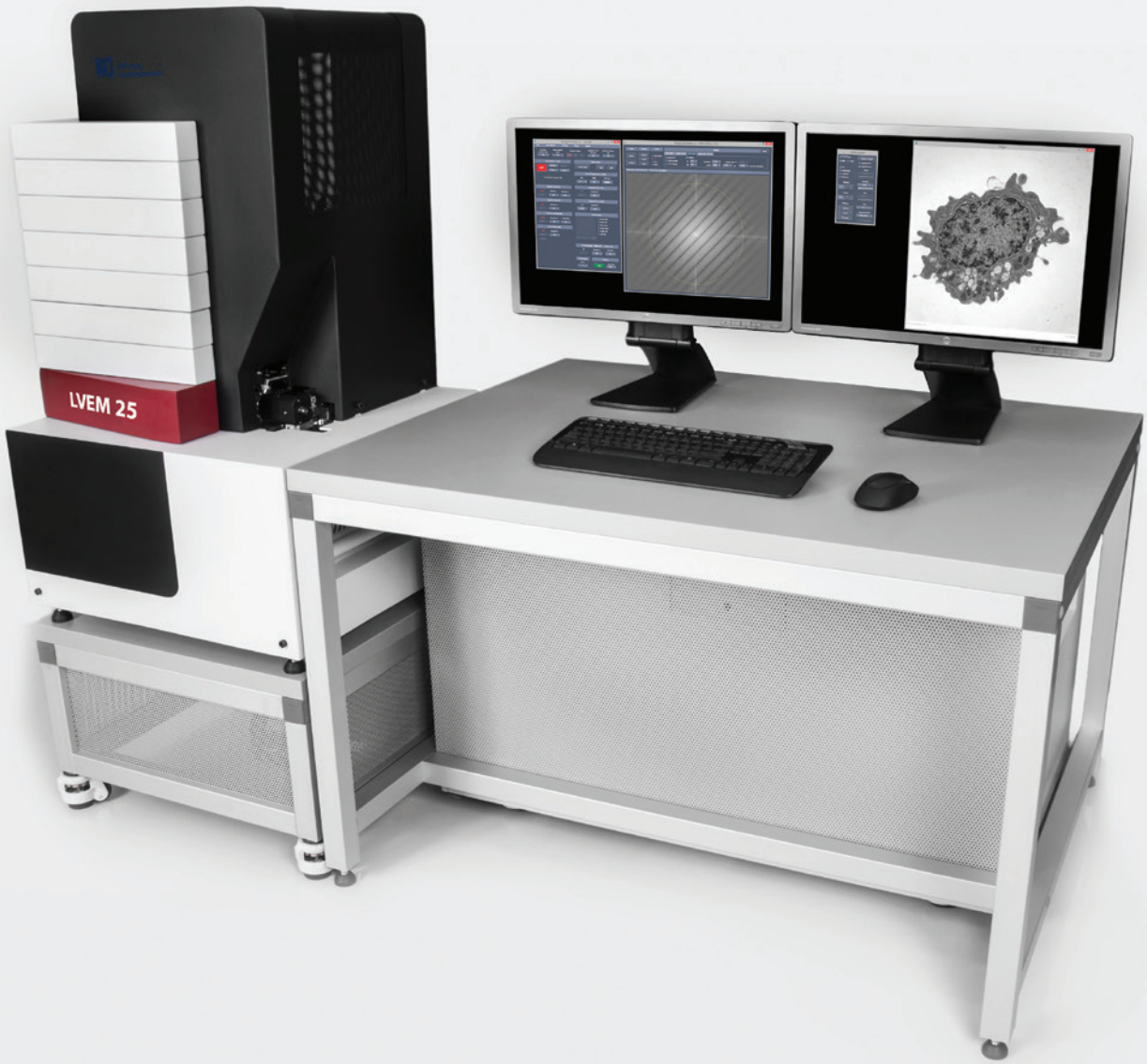
LVEM 25

Low Voltage Electron Microscope

fast | compact | powerful

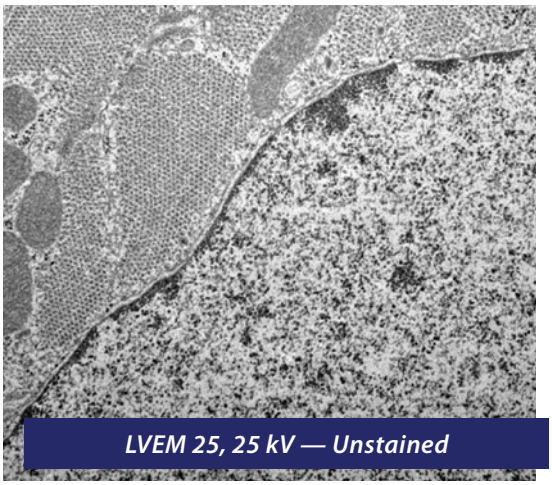


FAST, COMPACT AND POWERFUL

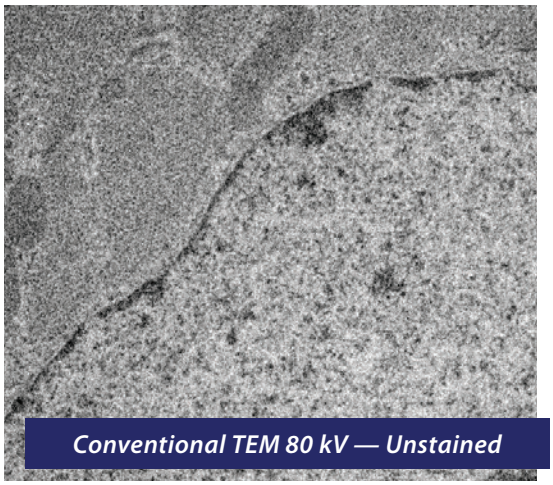
The LVEM 25 offers a high-contrast, high-throughput, and compact solution with nanometer resolutions.

All the benefits of Low Voltage, no limitations

The LVEM 25 is a unique investigative tool which combines transmission TEM and STEM observation modes. Substantially lower accelerating voltages (ranging from 25 kV to 10 kV) than conventional TEM (typically 80–200 kV) provide substantially improved contrast on light elements with conventionally prepared samples. Low voltages result in increased electron scattering and enhanced contrast on biological, organic and light materials, without the need for staining.



LVEM 25, 25 kV — Unstained



Conventional TEM 80 kV — Unstained

Design: Imaging where you need it most

The LVEM 25 has an architecture that differs from traditional models. It can be installed in a lab, on a desktop or benchtop; almost anywhere electron imaging is needed. The system can even be supplied as a mobile work-station. The system has no special facilities requirements, no need for a dark room, cooling water, or special power. Ownership and maintenance of this system are greatly simplified.

COMPONENTS

Field Emission Gun:

The uniquely-designed Schottky type FEG (field emission gun) employed by the LVEM 25 has very high brightness and spatial coherence with a lifetime of several thousand hours. The high brightness and small virtual source of the electron gun allows transmission and scanning modes in a single instrument.

Permanent magnet lenses:

The LVEM 25 is designed to operate without any cooling. With conventional electron microscopes active cooling is required to remove considerable heat generated by electric current circulating in the electromagnetic lenses. The uniquely designed permanent magnet lenses used in the LVEM 25 require no cooling.

Ion Getter pumping: clean vacuum, clean column, clean images

Ion pumps are inherently dry, vibration-free and achieve very high vacuum levels. By making use of specially designed ion getter pumps, the LVEM 25 avoids all contamination in the sample space, resulting in stable imaging conditions and the absence of any artifacts.

Transmission Electron Microscopy: inline, two stage optics platform

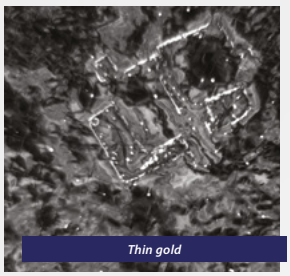
Electron optics provide the initial stages of magnification where the initial image is formed on a YAG scintillator screen.

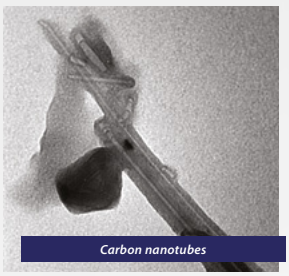
Light optics that are stable and reliable, further magnify the initial image from the YAG screen. Light transport from the fluorescent screen into the light optics is highly efficient.

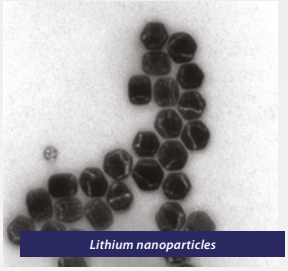
Digital Imaging is done by means of a Peltier cooled CCD camera with 2048×2048 pixels mounted on the top of the LVEM 25. The image capture software is designed for acquisition, documentation, and analysis of high performance image data. Various image processing procedures, such as summing, live FFT and automatic contrast adjustment are available.

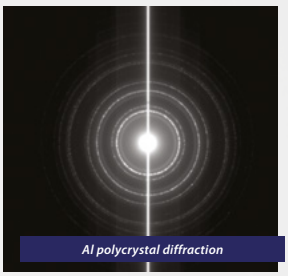
LVEM 25 for material sciences

Materials science is a complex field of study applying the different properties of matter to various areas of science, engineering, and nanotechnology. One of the most important tools available to scientists to investigate the structure of materials is the electron microscope.
The LVEM 25 electron microscope assists researchers in the field of materials science by providing high resolution, rapid imaging of their samples. The LVEM 25 shifts the cost-benefit balance by providing nanometer level resolution across TEM (Diffraction included) and STEM imaging modes. The LVEM 25 system combines all of this functionality into an easy-to-operate electron microscope.
The LVEM 25 is designed to excel across a broad range of applications such as nanomaterials, polymers, composites or blends, as well as biomaterials.


Thin gold

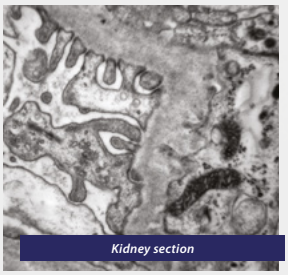

Carbon nanotubes

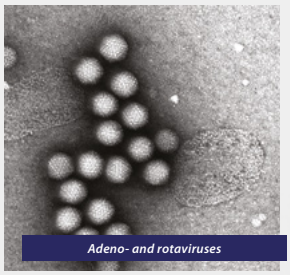

Lithium nanoparticles

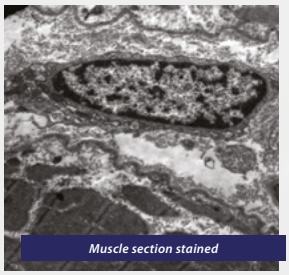

Al polycrystal diffraction

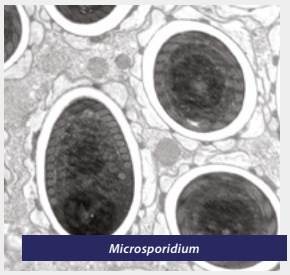
LVEM 25 for life sciences

Electron microscopy samples in the life sciences are normally a major challenge to image due to inherently low-contrast provided by their molecular composition. This is not the case when using the LVEM 25 in life sciences applications.
Low energy electrons interact much more strongly with the sample than high energy electrons of classical TEM, and are thus strongly scattered by organic materials, resulting in exceptional differentiation of features. The low accelerating voltage allows the system to provide high contrast results with no addition of contrast-enhancing staining procedures. The LVEM 25 enables imaging of classically prepared samples. High contrast results are acquired from samples in their inherent, natural state, although the system still provides for staining as an option.
Key application areas for the LVEM 25 include pathology, virology as well as drug discovery and delivery.


Kidney section


Adeno- and rotaviruses


Muscle section stained


Microsporidium

SPECIFICATIONS

OPERATION	
Specimen size	standard ϕ 3.05mm grids
Time for sample exchange	approx 3 min
IMAGING MODES	
TEM	
Nominal accelerating voltage	25 kV
Resolving power	1.0 nm
Total magnification*	1,127–430,743×
Field of view	100–0.25 µm
The smallest illuminated area	100 nm
Focal length	1.34 mm
C_s (spherical aberration coefficient)	1.03 mm
C_c (chromatic aberration coefficient)	1.05 mm
α_{theor} (theoretical aperture angle)	1.2×10^{-2} rad
** nominal (image 3¼×4")*	
ELECTRON DIFFRACTION	
Minimum probe size	500 nm
Camera length (binning 2×2)	2,000–7,000 pxl
Camera constant (binning 2×2)	15.51–54.28 pxl×nm
STEM 15	
Nominal accelerating voltage	15 kV
Resolving power	1.3 nm
Maximum magnification	375,000×
Maximum field of view	80×80 µm
Focal length	0.95 mm
C_s (spherical aberration coefficient)	0.80 mm
C_c (chromatic aberration coefficient)	0.85 mm
α_{theor} (theoretical aperture angle)	1.4×10^{-2} rad
STEM 10	
Nominal accelerating voltage	10 kV
Resolving power	1.0 nm
Maximum magnification	470,000×
Maximum field of view	105×105 µm
Focal length	0.75 mm
C_s (spherical aberration coefficient)	0.64 mm
C_c (chromatic aberration coefficient)	0.72 mm
α_{theor} (theoretical aperture angle)	1.6×10^{-2} rad
LIGHT OPTICS	
Objective Olympus M 40x	NA* 0.95
Objective Olympus M 20x	NA* 0.75
Objective Olympus M 4x	NA* 0.13
**numerical aperture*	

ELECTRON OPTICS	
CONDENSER LENS	magnetostatic
	electrostatic
Condenser aperture	Φ 50, 50, 30 µm
OBJECTIVE LENS	magnetostatic
Objective aperture	Φ 50, 50, 30 µm
PROJECTION LENS	electrostatic
	double lens
ELECTRON GUN	SE Cathode ZrO/W[100]
Current density	0.3 $mAsr^{-1}$
Lifetime	>2,000 hours
TEM IMAGE CAPTURE	
Camera	Retiga 4000R CCD
Sensor size	2048×2048 pixels
Digitalization	12 bits
Pixel size	7.4×7.4 µm
Cooling	Peltier cooling
SCAN IMAGE CAPTURE	
Monitor	512×512, 1024×1024, 2048×2048
Saving image	up to 2048×2048 pixels
Digitalization	8 bits
VACUUM	
AIRLOCK SYSTEM	
Diaphragm and turbomolecular pump	10^{-5} mbar
OBJECT SPACE	
Ion getter pump	10^{-8} mbar
ELECTRON GUN	
Ion getter pump	10^{-9} mbar
CONSUMPTION	
Control electronics in standby	25 VA
Control electronics	350 VA
Including airlock pumping system	550 VA
Camera	24 VA
PC and monitor	500 VA
No cooling water for the microscope is required	
WEIGHTS AND DIMMENSIONS	
ELECTRON AND LIGHT OPTICS	
Weight	80 kg
Dimensions	106×63×61 cm
CONTROL ELECTRONICS	
Weight	80 kg
Dimensions	110×63×67 cm

DISTRIBUTION

The LVEM 25 is supported globally by sales and service offices in local markets. Please consult our website for the distributor in your country. You can also contact us directly for any questions you may have or to be referred to your distributor.

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Please be sure to visit our websites. For more information please send us an email.