



Understanding decreasing dimensions

- *High performance in TEM imaging, STEM imaging and nanoanalysis*
- *Simultaneous data recording by fully embedding STEM, CCD cameras, EDX detectors, EELS spectrometers and energy filters*
- *Flexible high tension*
- *Robust routine analysis down to the sub-nanometer*
- *Ultra-clean vacuum*
- *Wide variety of optional FEI application software solutions, e.g. S/TEM tomography package and TruImage™ focal series reconstruction*

Tecnai™ G² F30

The benchmark for high performance nanoanalysis

The Tecnai G² F30 is a highly advanced, state-of-the-art 300 kV scanning transmission electron microscope (S/TEM) with an unrivalled task-oriented user interface. Running under Windows® XP operating system, it offers high performance with versatility, high productivity with ease of use, and all in a personal environment. The accessories that may be fitted onto these systems – e.g. STEM, CCD cameras, EDX and EELS detectors, and energy filters – are embedded into the user interface, allowing differently experienced operators to fully utilize the functionality of the total system through one coherent interface.

The Tecnai G² F30 is a reliable and proven S/TEM combining the advantages of a 300 kV high tension with a field emission system. The advantages of a field emission system are its better coherence and higher brightness. As a benefit resolution in TEM (information limit) and STEM mode are expanded and a much higher current can be delivered into a fine probe giving access to microanalysis with sub-nanometer spatial resolution.

The 300 kV electron beam of the Tecnai G² F30 delivers higher resolution for a given objective lens geometry, a higher beam current and better sample penetration compared to a 200 kV TEM. The flexibility to change the high tension to any other value in a minute helps to work always at optimum experimental conditions. Typically two different accelerating voltages are aligned including the energy filter upon installation, more can be requested. Mode changes are trivial and an unlimited number of alignments can be stored user specifically making optimization and mode switching rapid and trivial. The Tecnai G² F30 can be supplied in a variety of custom configurations. A range of patented symmetric objective lenses are available, all with their unique performance focus to exactly meet the requirements and need for different applications: high resolution work (S-TWIN) or ultra high resolution (U-TWIN), and for high tilt applications (tomography series attainable up to $\pm 75^\circ$). In addition, a wide variety of FEI software solutions are available for different applications, calibration, automation, scripting and remote control.

Essential specifications

Electron source

- Flexible high tension (50, 100, 150, 200, 250, 300 kV and values in between)
- Schottky Field emitter with high maximum beam current (> 100 nA)
- High probe current (0.6 nA in a 1 nm spot, 15 nA in a 10 nm spot)
- Small energy spread (0.8 eV or less)
- Spot drift < 1 nm/minute

Imaging

- Patented TWIN, S-TWIN and U-TWIN objective lenses
- Coma-free alignment for high resolution objective-lens centering
- Ranged, rotation-free magnification and diffraction series
- Magnification reproducible within $\pm 1.5\%$
- Embedded CCD/energy filter
- Lorentz lens for field free imaging for magnetic field visualization (optional)

STEM

- Fully digital scan system
- Bright Field and Annular Dark Field mode
- High resolution STEM with HAADF detector

Microanalysis

- Excellent EDX in-hole performance (< 1% hole count)
- Low system background in EDX (< 1% spurious peaks)
- High P/B ratio (Fiori number) > 4000
- Embedding of EDX, PEELS and energy filter
- Spectrum imaging with multiple detectors

OBJECTIVE LENS TYPES

	TWIN	S-TWIN	U-TWIN
TEM point resolution (nm)	0.24	0.20	0.17
TEM line resolution (nm)	0.144	0.102	0.102
Information limit (nm)	0.15	0.14	0.10
Extended resolution (Truelmage)	0.17	0.16	0.12
Minimum focus step (nm)	2	1.8	0.5
TEM magnification range	58 x - 800 kx	60 x - 1,000 kx	60 x - 970 kx
Camera length (mm)	100 - 5,600	80 - 4,500	90 - 5,000
Maximum diffraction angle	$\pm 11^\circ$	$\pm 12^\circ$	$\pm 15^\circ$
STEM HAADF resolution (nm)	0.24	0.19	0.14
STEM magnification range	150 x - 230 Mx	150 x - 230 Mx	150 x - 230 Mx
Maximum tilt angle with double-tilt holder	$\pm 70^\circ$	$\pm 40^\circ$	$\pm 30^\circ$
Maximum tilt angle with tomography holder	$\pm 80^\circ$	$\pm 80^\circ$	n/a
EDS solid angle (srad)	0.13	0.13	0.13

Specimen stage

- Fully computer-controlled, eucentric side-entry, high stability CompuStage
- Maximized tilts for any X,Y,Z, α and β combination
- Choice of a variety of specimen holders
- X, Y movement ± 1 mm, Z movement ± 0.375 mm; specimen size 3 mm
- Specimen recall reproducibility: ≤ 0.3 μm (after movement of 300 μm in x and y) and ≤ 0.1 (α tilt)
- Drift ≤ 0.5 nm/minute with a standard holder attainable

Vacuum

- Fully interlocked differentially pumped column
- Clean vacuum system with turbo molecular pump, prepumping column, gun and specimen airlock
- 150 l/s Ion Getter Pump on specimen area

- Liner tubes pumped by additional Ion Getter Pump
- Ultra-high vacuum for contamination-free observation
- Vacuum levels: specimen chamber $< 2.7 \times 10^{-5}$ Pa ; gun $< 5 \times 10^{-7}$ Pa
- Fast airlock pumping times: user selectable down to < 1 min
- Plate camera exchange without switching off high tension or emitter

Software and control

- Operations system: Windows[®] XP
- Remote operation (optional)
- Motorized apertures (optional)
- Scripting software (optional)
- Xplore3D™: FEI's intelligent tomography solution for TEM and STEM (optional)
- Truelmage: FEI's patented focal series acquisition and reconstruction software package (optional)

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TUV Certification for design, manufacture, installation and support of focused ion- and electron-beam microscopes for the NanoElectronics, NanoBiology, NanoResearch and Industry markets.