Tecnai™ G2 TEM Series
Intuitive, Versatile TEM for Materials Science
FEI’s Tecnai™ G2 Transmission Electron Microscope (TEM) Series combines fast, efficient and simple operation with proven reliability to deliver a TEM platform that suits many applications needs—from basic, rapid sample screening to unique, sophisticated experiments requiring superior analytical capabilities.

- Excellent imaging performance: The best high resolution imaging and diffraction data in uncorrected S/TEM
- Outstanding analytical versatility: With high tilt range, automation and dynamic focus adjustment, Tecnai supports a wide range of techniques including high resolution scanning S/TEM, diffraction, chemical analysis and 3D tomography
- Accelerated productivity in multi-user facilities: Unique field emission gun registry and customizable settings for critical instrument parameters ensure quick results and efficient use management

<< HR-TEM image of Si₃N₄ crystal. Image acquired on Tecnai F20 S-TWIN.
Setting the Standard for Easy-to-Use TEM

At its introduction, Tecnai enabled transmission electron microscopy, a technique typically reserved for highly experienced materials research operators, to be easy to use. Tecnai software and hardware innovations allowed TEM to be accessible to anyone familiar with operating a scanning electron microscope (SEM). Today, the Tecnai G2 TEM series continues to offer an intuitive platform while delivering imaging and analytical results in the shortest amount of time.

High Quality Results—Rapidly and Easily

For users of all experience levels to obtain consistent, high quality imaging results, Tecnai G2 software automates alignment routines and features pre-defined data acquisition settings. All electron source and optical alignments, as well as experiment settings, can be saved for instant recall at a later time, ensuring reproducibility of repetitive investigations.

Control of all accessories for Tecnai, like STEM, CCD cameras, EDX and EELS detectors, and energy filters, is embedded into the user interface, allowing differently experienced operators to fully utilize the functionality of the total system from a single screen.

Without the added complexity of correctors, Tecnai G2 TEMs allow more advanced analytical studies, in situ experiments, tomography or cryo-TEM to be achieved readily without requiring lengthy training.
HR-TEM image of doped ZnO nanocrystal acquired with Tecnai F20. Sample courtesy of Prof. W. Mader, Institute of Inorganic Chemistry, Bonn, Germany.

HR-TEM image of Si crystal acquired on Tecnai F20.

HR-TEM image of Si₃N₄ nanocrystal acquired on Tecnai F20.

STEM image of crystalline polymer. Sample courtesy of Prof. Felix H. Schacher, Friedrich-Schiller-University of Jena, Germany.
Unmatched Analytical Versatility in Uncorrected TEM

Build your ideal configuration with compatible accessories that are assured to function at their optimum design performance. Tecnai is designed to allow multiple techniques to work together on the same platform without compromise. Create your ultimate characterization solution, combining diverse applications like bright and dark field and high-angle annular dark field (HAADF) STEM with X-ray energy dispersive spectroscopy (EDX) and electron energy loss spectroscopy (EELS) capabilities. Each technique will be executed at an optimized performance for the particular application.

Achieve Expert Analytical Results

Enjoy flexible chemical mapping: Carry out a variety of chemical studies, from fast STEM imaging and chemical screening to complex experiments involving EDX.

Bright field TEM (left) and dark field STEM (middle) images of opal nanospheres. The aggregated nanospheres are composed from amorphous silicon and microcrystalline magnesia. EDX line scan across opal nanosphere (line scan mark is shown in STEM image). Opal sample courtesy: Dr. Angelica Chiodoni, Center for Space Human Robotics, Torino Italy.
Customize sample parameters: Variable beam energies allow you to optimize data acquisition parameters for both your sample and your desired analytical results.
Gain New Materials Insights

When your research needs include 3D visualizations and morphological studies, Tecnai is ready to deliver. The large sample area accommodates required detectors and accessories as well as large tilt angles or bulkier specimens. Tecnai enables you to move beyond basic 2D imaging and analysis into advanced applications like 3D reconstructions for specimen structure studies, diffraction studies of crystal structure in solids or in situ studies for visualizing sample morphology.

Enabling Advanced Characterization

Simplify 3D Tomography: FEI’s Xplore3D™ and Inspect3D™ software programs automate and optimize 3D STEM imaging and reconstruction, delivering the most accurate data.
Streamline diffraction: Characterize crystal symmetry and properties efficiently. Tecnai’s user interface guides the process of choosing a proper diffraction mode, while k-Space control software indexes diffraction patterns to simplify identification of zone axes in crystal.

Large angle convergence beam electron diffraction of Si crystal; [100] orientation.

Large angle convergence beam electron diffraction of Si crystal; [111] orientation.

Electron diffraction pattern obtained by systematic tilting of BaTiO₃ crystal. Courtesy of Soumitra Chatterjee.
Start with a Configurable Platform to Best Match Your Applications

LaB₆ source: For ease of use over a broad range of applications and simpler maintenance, select a Tecnai G2 TEM with the LaB₆ electron optical system. These instruments are particularly well-suited for a multi-sample, multi-user facilities that routinely perform TEM/STEM imaging, electron diffraction, 3D tomography and in situ and dynamic experiments in TEM.

Field emission source: For extra performance, Tecnai field emission TEMs offer superior imaging capabilities combined with the best analytical performance. The Tecnai FEG series is extremely well-suited for chemical analysis (STEM + EDX), 3D STEM imaging, diffraction and in situ experiments.

Variable beam voltage: Tecnai offers the most flexibility in beam energies, allowing the electron beam to be precisely tailored to material properties, dose requirements and experiment needs. The acceleration voltage on all 200 kV models is variable (between 20 kV and 200 kV) to support the best conditions for imaging and spectroscopy. The 300 kV platform allows an acceleration voltage range of 50 kV to 300 kV, which supports applications with thicker samples or requirements for better optical resolution.

Column optics: A choice of optical configurations affords the best performance for your primary applications. Our X-TWIN objective lens offers the best analytical and STEM performance combined with high tilt and large sample space. The S-TWIN and TWIN objective lenses offer the best support for in situ and dynamic applications requiring large sample space and high tilt, as well as for cryo-TEM applications. The U-TWIN lens offers the best optical resolution and performance for ultra-high resolution (UHR) imaging in TEM and STEM.

### Application Solution from Tecnai LaB₆ Platform

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### Application Solution from Tecnai FEG-Series Platform

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Add Software to Expand Your Applications Range

Tecnai software contains a set of multifunctional auto alignment packages that make TEM operation easier and more efficient. AutoGun and AutoAdjust routines help with fast and accurate tuning of imaging conditions. Grid Scanning and Photomontage are indispensable for low magnification surveying and imaging of large specimen areas.

The Tecnai software platform’s diversity delivers additional utility through software packages designed for special applications.

- **Smart Tilt** and **k-Space**: Align zone axis
- **Free Lens Control**: Tune optical settings to the chosen, unique configuration or retrieve desired optical settings instantly when a different image acquisition parameter becomes necessary
- **Magnification Calibration**: Check and maintain the calibration for any individual measurement
- **Compucentricity**: Utilize this calibration routine to adjust specimen eucentricity, especially when high tilt angles are required

Additional application-specific software packages further optimize the Tecnai for specific use (e.g., hollow-cone for diffraction, or low-dose for controlled electron dose exposure). FEI’s tomography acquisition packages, Xplore3D and Xplore3D Express, offer rapid and powerful reconstruction while Inspect3D makes tomography series acquisition and rendering fast, seamless and easy.

For applications such as interface characterization, gate oxide analysis, grain boundary studies and nano-particle characterization, the shape of particles shown in normal HR-TEM images is often unclear due to the delocalization effects. Truelmage™ software automates acquisition of through-focus series and exit wave reconstruction to help determine the real size and active surface of nanoparticles which is important for calculating their surface volumes correctly. This reconstruction leads to directly interpretable high resolution images. The software will correct for imperfect user alignments of the electron column, like coma or astigmatism, to ensure the highest quality resolution, reaching the full information limit of Tecnai.
About FEI

With more than 60 years of microscopy innovation and leadership, FEI provides the widest range of electron, ion, and digital light microscopy instrument, workflow, and application expertise in the industry. FEI solutions help customers worldwide answer questions, make breakthrough discoveries, accelerate time to market, and achieve competitive advantage. Rich problem-solving experience from across the electronics, life science, materials science, and natural resources markets enables FEI to bring fresh perspectives to customers’ challenges, whether small and simple or large and complex. FEI people and solutions drive research, propel progress, and ultimately, help change the world.

Visit www.fei.com for more information.