

Tecnai G² All-for-You

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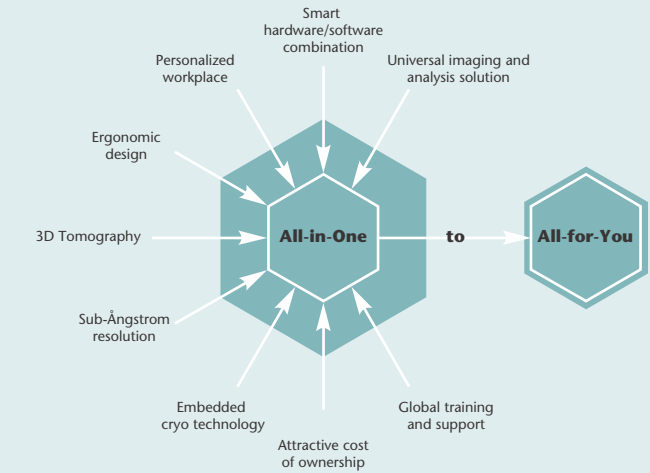
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Discovering new horizons in microscopy

I like to think of myself as a pioneer, charting undiscovered territories, but in the nanoworld rather than some distant land



In a world where rapidly decreasing dimensions play an ever-increasing role in advancement, the second generation Tecnai G² series redefines your boundaries of possibility

Universal microscopy solutions

Any one of the Tecnai G² series offers a truly universal imaging and analysis solution that seamlessly embeds all peripherals and software in to one powerful instrument. It puts you in total digital control of your advanced transmission electron microscopy (TEM) environment, and takes the proven Tecnai 'all-in-one' concept to a new level. Bring 'all-for-you' microscopy solutions to life sciences, materials sciences, nanotechnology, semiconductor and data storage research and industries.

Closing the gap between man and machine

Interacting with one of the Tecnai G² series advanced microscopes is more than simply operating a (S)TEM. We have made collecting data an improved human experience by ergonomically and smartly designing the instruments to ensure everything falls naturally into place. A Tecnai is easy to operate, enabling higher performance and capabilities for a much wider group of users. Ease of use, embedding and automation are

key words that describe the interaction between man and machine when acquiring high quality information out of your sample. Fitting seamlessly in today's modern laboratory, a Tecnai G² enables you to experience fast time to smart data in an ergonomic environment.

Advanced and proven performance

Tecnai G² series combines mature imaging and analysis technologies continuously with novel and advanced capabilities that push the performance of (S)TEM and its applications. It features proven advanced optics and techniques which underline FEI's commitment to furthering (S)TEM some of which include: monochromators for unprecedented high resolution analysis, correctors for advanced performance, special solutions for in-situ and dynamic experiments, advanced spectrum imaging, helium cryo microscopy, 3D imaging and various smart application software solutions. Top level papers printed in leading journals and lectures held at world-wide conferences demonstrate their repeated excellence and proven performance.

Every second counts

Meeting the time challenge

The Tecnai G² is designed –hardware and software- to help you get high quality results to the people who need them as fast as possible. The hardware and software are optimised for recording data when doing your microscopy work: time needed for switching between operational modes, techniques, settings and conditions or even high tension and getting high quality performance are a matter of seconds. Sample exchange is fast. The software ensures ease of use and transforms hardware and applications expertise into solutions that reduce the time to smart data.

When time is of the essence, the intuitive nature of the Tecnai G² series ensures you get accurate results faster than ever before

Fast time to smart data

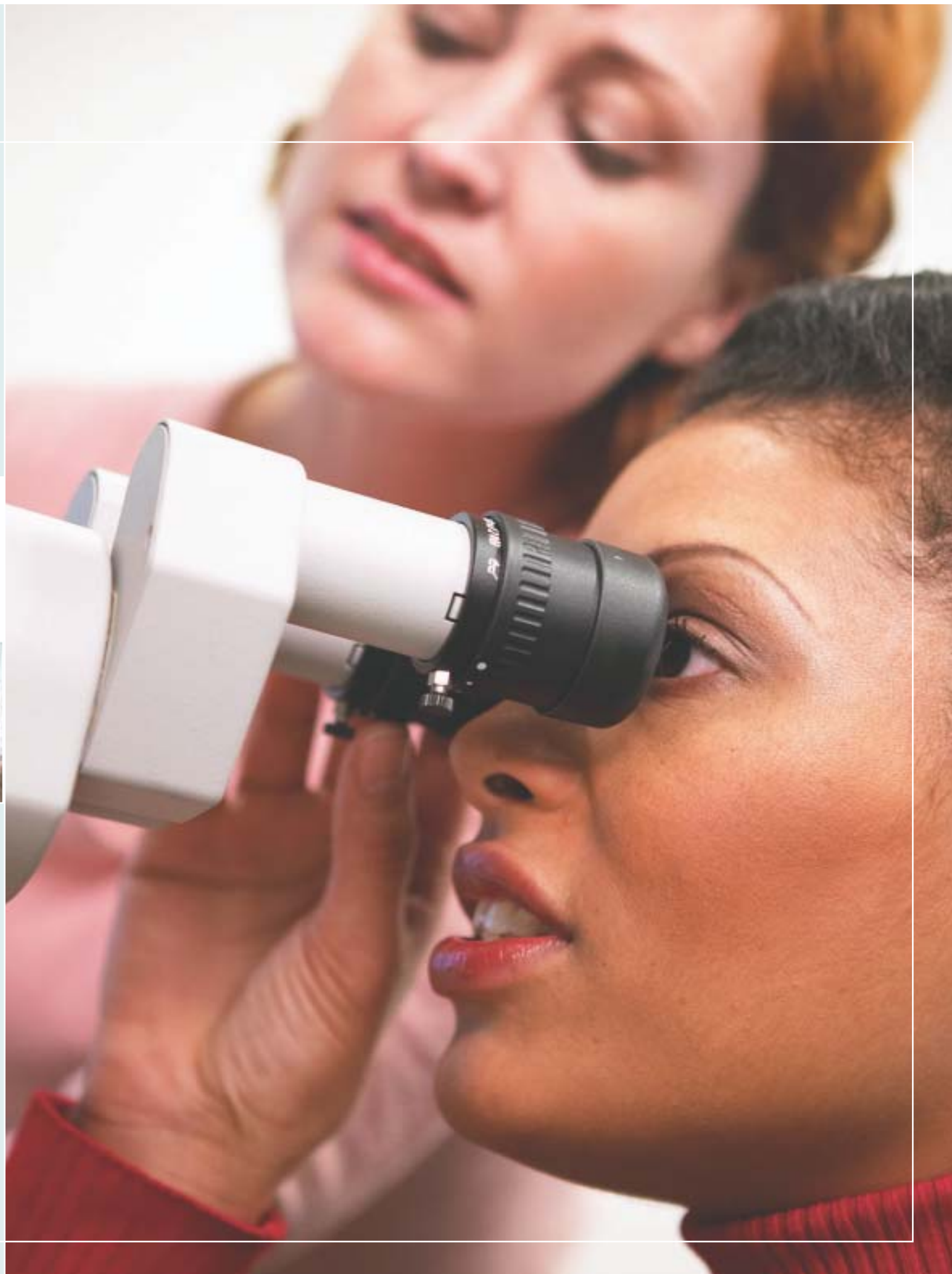
The net result of this philosophy is high productivity without compromising quality of results. A balanced combination of innovative hardware and software has been developed to close the gap between man and machine. The look and feel of the instruments takes the next step forward in performance, reliability and automation.

Get up-and-running fast

To lower the threshold to smart data and to get started fast, FEI Academy offers dedicated training and applications programs for novice operators and experienced microscopists. The levels of skills and expertise required for acquiring quality results are less demanding than ever before, allowing you to take a more cost-effective approach to operation. You also benefit from comprehensive back up from FEI in terms of excellent service and access to microscope and applications know-how. The instruments are provided with on-line help and with ready-to-work instructions that show-how to get to the results fast and accurately.



I insist on more than just data. I need quality results, and I need them fast





Life just got easier

At the heart of your TEM capabilities

The most important element of a Tecnai G² system is the operator. By placing you and your requirements at the centre of the (S)TEM, work becomes less complicated - and a lot more efficient. You can even drive your Tecnai G² instrument remotely from another location, bringing the benefits of shared resources within reach. On a platform which can support multiple users, each user has their own secure and customized environment, working with their own set of supervised settings, controls and alignments. The Tecnai G² series provides con-

venient push-button controls and truly embeds all peripherals to make advanced spectrum imaging techniques or other advanced applications fast and reliable.

Personalize your workplace

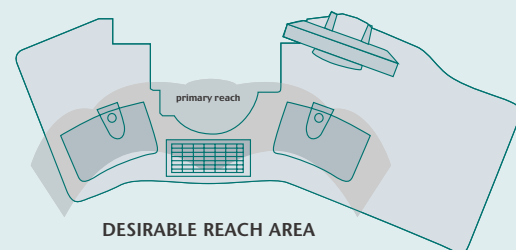
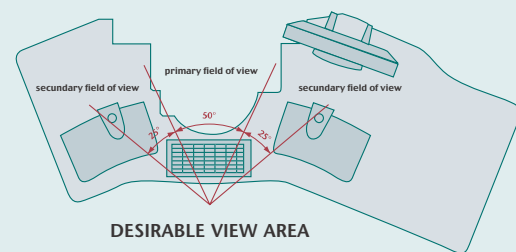
A Tecnai G² workplace is easily personalized, it's possible to create a configuration that fits your needs exactly today and that it remains adaptable to accommodate your future requirements. Functionality can also be tailored thanks to dedicated applications software designed by leading experts. Tecnai G² fits the way you work (such

Simplicity, ergonomic design, automation and the ability to personalize your Tecnai G² help make your work a lot more efficient – and a lot less complicated

*I'm getting the work done the way
I want it done... Effortlessly!*



as in daylight or darkness, single or multiple experiments, and so on) and is easily integrated into your laboratory automation environment. An Ergonomic Microscope Control Package to further improve working posture is also available.



Mouse control pads, keyboard and monitors are situated within desirable viewing and reach areas for optimised ergonomics.

Making TEM ownership more accessible

FEI takes full system responsibility for its Tecnai G² microscopes: that goes for all hardware and software components, even for third party systems that have been embedded in the microscope. This full system responsibility makes ownership easier because you will have just one point of contact: FEI. This means that there is no need for you to manage a range of suppliers, therefore simplifying logistics and service, ensuring compatibility and streamlining support when needed. We also offer you expert advice on the choice of independent 3rd party items, like cameras. We do our best to expand and enhance your comfort of ownership of any of the FEI suite of products.

Mastering the third dimension

3D Imaging by electron tomography

Studying the third dimension reveals the true nature of specimens. Electron tomography, a technique whereby images are recorded in as many tilt-angles as possible, is used in STEM and TEM to create a high resolution 3D volume image. Previously done manually, you can now carry out the underlying routines quickly and accurately in TEM, STEM and even Cryo low dose with FEI's Tecnai G² series and proprietary software solutions that are optimized for acquiring high quality tomographic data sets within minutes instead of hours.

Automated data acquisition and reconstruction software

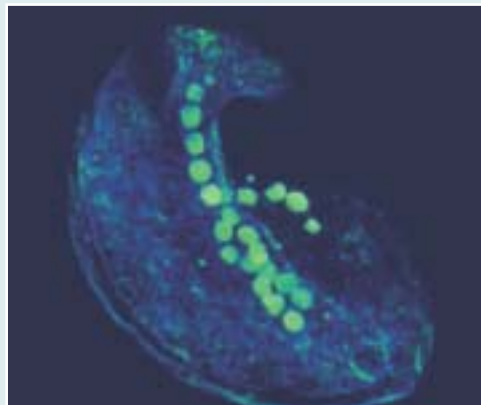
Embedded in the microscope's user interface, the user centred data acquisition software guides the user through the complete automated process using a self-explanatory workflow approach to arrive at high quality results. FEI's tomography solution includes software reconstructing the tilt series into a 3D data set using a variety of advanced techniques resulting in the highest quality data that resembles the true 3D nature of the sample best.

A complete 3D imaging solution

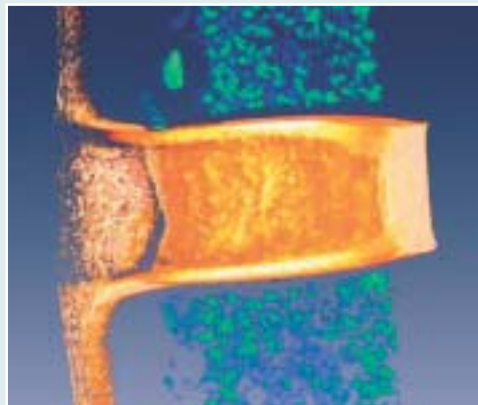
The Tecnai G², with its fully embedded CCD cameras and STEM detectors, and Xplore3D Tomography Suite form a complete and intelligent 3D imaging solution for data collection, reconstruction, visualization and analysis. Obtaining and presenting results in a 3-dimensional and animated way, Xplore3D is the fast and reliable way to gain insight into complex structures. It is suited for 3D applications in life sciences, nanotechnology, materials sciences and semiconductor industries, as it is designed for acquisition in TEM, STEM and even Cryo TEM.

Length, height, width. That's the way I like to see the world

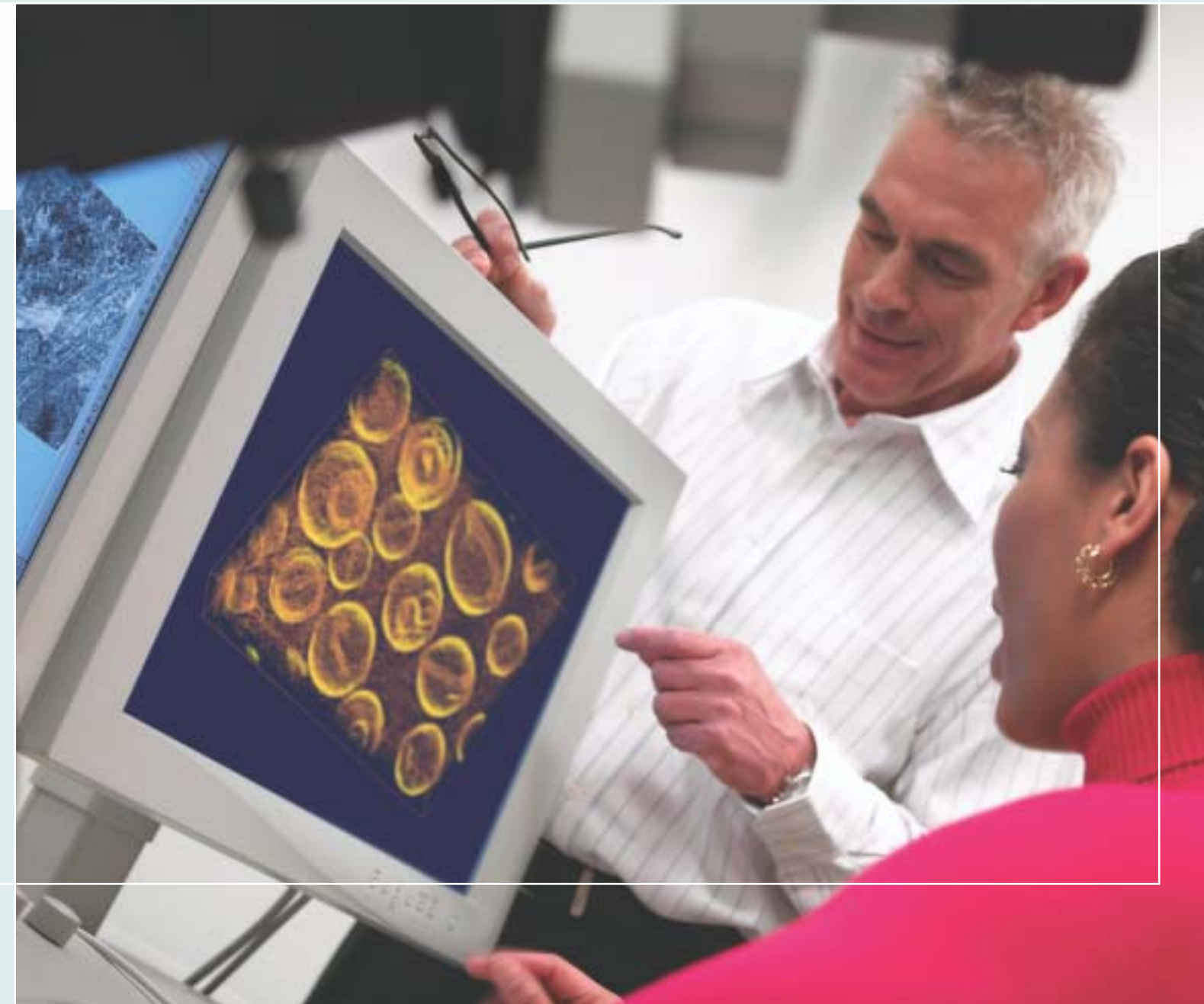
With the powerful Tecnai G² tomography capability, you view the nano-world in natural, revealing three dimensions



3D image of Magneto tactic Bacteria using Xplore3D TEM. Sample Courtesy: National Institute of Advanced Industrial Science and Technology, Osaka, Japan



3D image of Copper Contact with surrounding porous SILKTM resin. Sample Courtesy: The Dow Chemical Company and IMEC, Leuven, Belgium

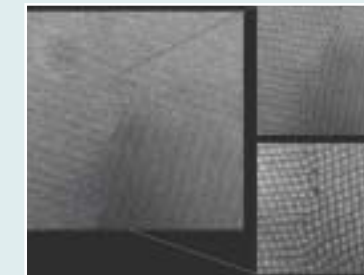




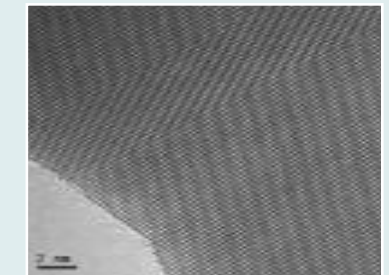
Enabling optimum performance

High-resolution exploration at nanometre levels

The Tecnai G² series incorporates a new high-performance monochromator that reduces the energy spread in the electron beam by a factor of ten. The result of several years' development, this monochromator features balanced electric and magnetic deflection fields with extreme accuracy in an ultra-high vacuum surrounding. Compared to existing monochromatic systems, the FEI monochromator is extremely compact, keeping the height of a Tecnai G² the same as that of a standard (S) TEM.



Clear atomic resolution of gold atoms with a crystallographic twin in the centre of the image taken on a TF20 S-Twin with image corrector



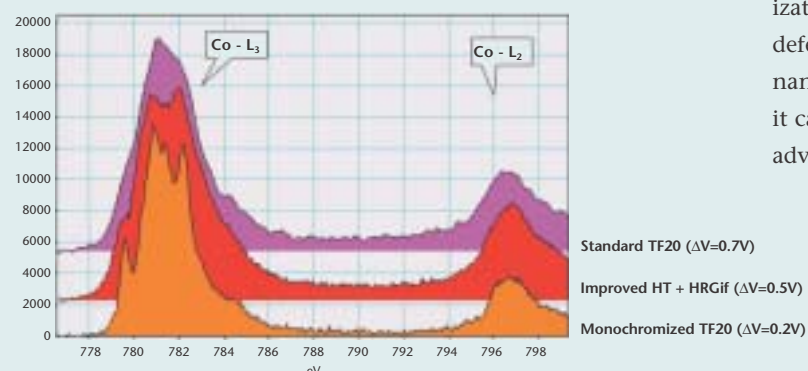
TF20 S-Twin with image corrector on the objective lens shows clear atomic resolution of gold atoms with a crystallographic twin in the centre of the image.

With the new Tecnai G² monochromator, you are able to explore exciting new fields with nanometre resolution



I'm now seeing things I always knew were there

Significant improvements in energy spread possible by using a monochromator. As shown here, the fine edge structure i.e., bonding states can be more clearly resolved using this capability.



Explore high-energy-resolution EELS

With the FEI monochromator, you will be able to explore the unknown field of high-energy-resolution EELS with nanometre resolution. It can provide you with new insight on how chemical bonding states can vary over interfaces of nanometre size and on the local changes of band-gap energies in nanometre constructions.

A breakthrough in electronic characterization

It also represents a breakthrough in electronic characterization of nanometre-sized gate oxides, quantum wells, defects, multilayers, catalysts and nanotubes with sub-nanometre spatial resolution. In nanotech industries, it can help accelerate the time-to-market of the most advanced products.

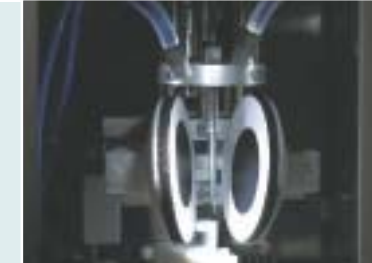


Move forward with Cryo TEM

The power of cryo electron microscopy

Cryo TEM is a powerful technology to study morphology in 2D or 3D of a wide range of samples in their natural state. These samples can be of solid or liquid nature. Cryo TEM is more than low dose imaging at cryogenic temperature: it encompasses sample preparation by vitrification optimised with FEI's Vitrobot, cryo transfer, sample protection and minimum dose searching and acquisition –on film or on CCD cameras. Special software minimizes the dose on the specimen while performing the experiments. FEI has dedicated solutions for cryo TEM on Tecnai G² based on 3rd party cryo holders or based on FEI's own proprietary high-throughput cartridge

The option of integrated cryo (helium) technology simplifies taking a closer look at macro-molecular assemblies



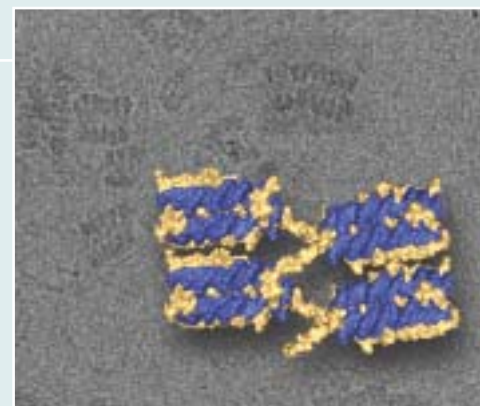
system for liquid nitrogen or helium temperatures. All solutions represent the culmination of more than 25 years of vacuum technology development and electron optical techniques that are required for cryo electron microscopy and software knowledge. The integrated and embedded cryo functionality makes the tool exceptionally suitable for high-resolution investigations in structural and molecular biology research.

A dedicated high-through solution

For the ultimate performance in cryo TEM, a unique dedicated high-throughput Tecnai is available: Tecnai G² Polara. The 300kV microscope combines high resolution performance, high-tilt capability, best specimen protection at liquid nitrogen and liquid helium temperature with a cryo transfer cartridge loading system. The cartridge loading system allows multiple frozen hydrated samples to be repeatedly investigated in any order during the working day. It has an ultra-high vacuum and ultra-clean specimen environment. 3D tomography at cryogenic temperature can be easily combined with this tool.

I can prepare and look at my specimens in their natural state, at high resolution

Cryo EM image and 3D Model of Nucleosome Core Particles. Sample Courtesy: ETH Zürich, Switzerland

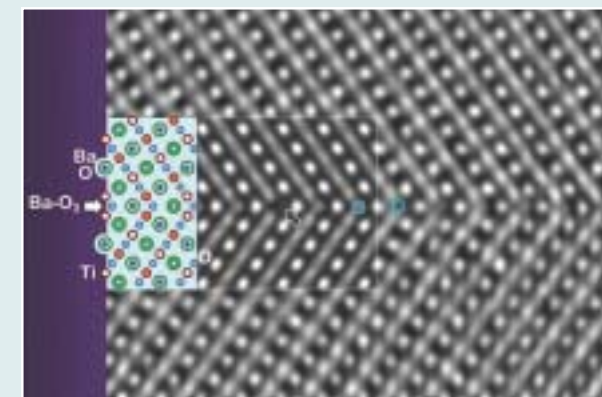


Software for smarter data, faster results

Software simplicity

We believe that you should realise the full potential of any one of the Tecnai G² instruments you choose. Because we design, develop and supply both the hardware and software, we integrate our in-depth knowledge in each system's capabilities. Therefore delivering you an all-in-one system that ensures you realize the full potential of all your laboratory applications through your Tecnai G² microscope.

Tecnai systems are fitted with the unique extended resolution capabilities. This image shows an exit-wave reconstruction of a boundary which clearly shows the atomic positions.



We design our applications software for analyzing and enhancing results to ensure you deliver what your customers expect – fast!

Hardware and software in perfect harmony

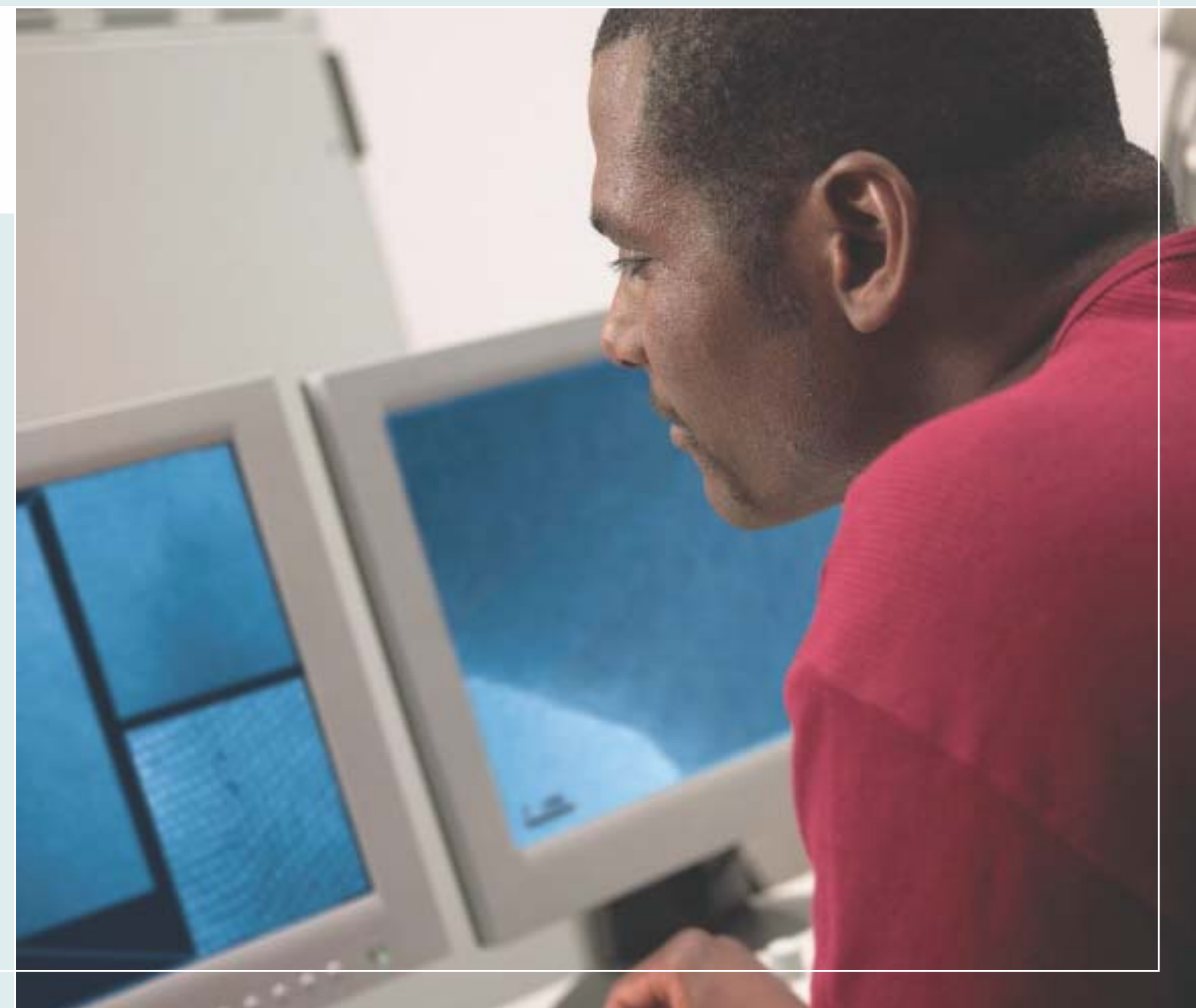
Because both the hardware and software are optimized for the Tecnai G², all elements are in perfect harmony with each other. The dedicated software not only enhances ease-of-use, but also ensures you get the full benefit of the system's leading-edge performance.



Application and control software

The full range of FEI software includes Tecnai control software, imaging and analysis (TIA) software for data acquisition as well as applications software automating and/or assisting in EM techniques. Software from FEI uses independent and internally consistent calibrations leading to a reproducible process and accurate data. The software has been developed in close collaboration with our end-users.

I can now provide real answers and not just reams of data that take ages to decipher



A Tecnai G² solution for every application

Five series, tailored configurations

There are five models in the Tecnai G² transmission electron microscopy family: T12, T20, TF20, T30 and TF30. These are categorized on the principal maximum acceleration voltage used (120, 200 and 300kV) and on the source type (thermo ionic or field emission gun). The lens type of the microscope is the next degree of freedom when configuring. A range of patented symmetric lenses are available: Bio-TWIN, TWIN, S-TWIN, X-TWIN and U-TWIN, all with their unique performance

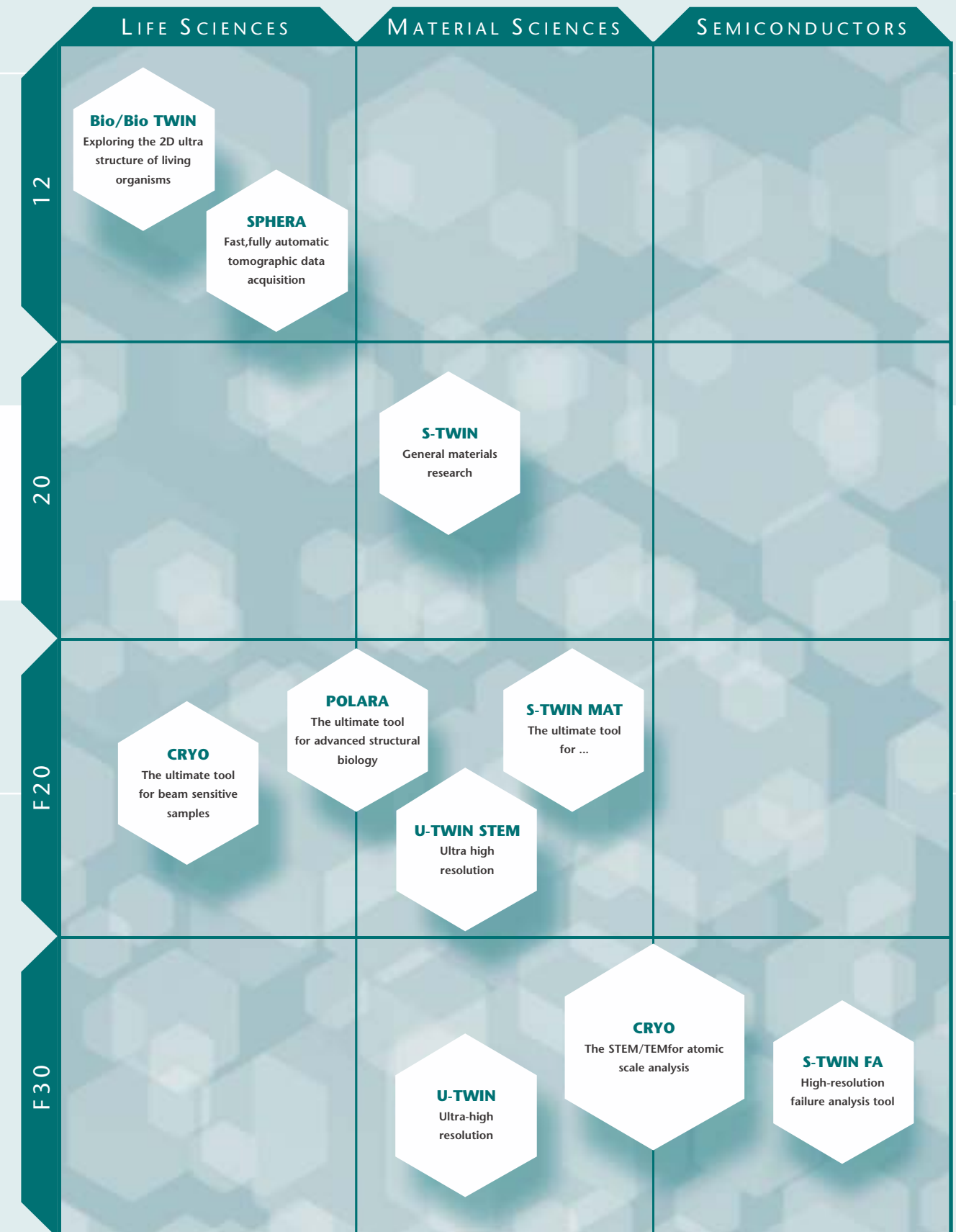
–optimized for high contrast imaging, maximized sample manipulation space, high resolution, ultimate X-Rays analysis performance, or ultra-high resolution- to exactly meet the set of requirements and needs for your microscope. Each model has a common user-interface and each of the tailored configurations are available for specific tasks in Life Sciences, Materials Sciences, Nanotechnology, Semiconductor and Data Storage research and industries, or even in a combined field of research.

Not only is there a Tecnai G² that fulfils your application needs, it is also possible to enhance its potential with a broad range of accessories

Powerful functionality

Tecnai G² sets trends in the (S) TEM market with features like remote control, 3D imaging, ergonomic design and automation. Tecnai G² is still the only available advanced transmission electron microscope that allows you to benefit from true digital control and 3rd party embedment: all microscope functions are digitally controlled and centralized in one universal imaging and analysis environment. The full embedment full digital control concept allows data acquisition from all detectors into one control system, simplifying operation and allowing complex multiple signal experiments done easily, quickly and where possible automatically.

A wide range of functionality and techniques is available and can be combined on Tecnai G², to name a few: HR-TEM, HR-STEM, (UHR)EELS, EFTEM, EDX, Lorentz imaging, Holography, Cryo TEM, 3D imaging, advanced spectrum imaging, strain/stress measurement; using embedded detectors and components like BF/DF, HAADF, Lorentz lens, biprism, cryo holders, CCD and TV-rate camera's and corrected optics. There is a Tecnai G² solution for every application.



Get the best for your organization

Training programs, on-site support, e-learning and instructional documentation ensure you and your personnel get the best from your Tecnai G²



What Tecnai G² really means

The Tecnai G² design philosophy addresses the human aspect of using a high quality leading (S)TEM. It's not just about machines and data, not just about excellence in technical performance but also about the extension of personal achievement. To ensure you get maximum benefits for your organization, we offer dedicated training programs – either on-site at your location or at one of our training site of FEI Academy. E-learning, applications courses and workshop are available.

Dedicated training programs

Dedicated training is pivotal in FEI's customer support philosophy. Training aims to share and transfer operational skills and to show the versatility and possibilities of various electron microscopy techniques. Above all, it strives to show you how to reach your best result for different applications. In other words: FEI Academy – a mature competence centre- helps you maximize the value of your installed equipment, by optimizing the potential of the person controlling it. Please visit our website www.feiacademy.com to learn more about FEI Academy and the latest course and workshop offerings.



*Ah yes, now I know exactly what
Tecnai G² can do for me*



The value of Tecnai G² ownership

Solutions for leading-edge disciplines

The quality, innovation and all-for-you design of the Tecnai G² series has redefined the (S)TEM workplace in life sciences, materials science, nanotechnology and the semiconductor and data storage research and industries. There is a full range of solutions for the best imaging and analysis at the highest resolution in the shortest amount of time. This is what is important to you. What is important to you is important to us.

Beyond the bottom line

By keeping the cost-per-measurement down, the Tecnai G² increases the productivity of your personnel, leading to higher throughput, faster time to smart data. This is possible due to the well engineered advanced high performance hardware and optimized software combined to deliver high levels of automation, ease-of-use in a modular all-in-one solution. Following a dedicated FEI Academy training programme gets you up and running that much faster.

Tecnai G² can make a difference to your organisation today, tomorrow and beyond

Ticket for the future

The unique true digital design of the Tecnai G² ensures applications functionality for today and tomorrow. It holds your ticket to the future: applications functionality can be added or upgraded by uploading current or future application software. This will allow you to keep pace with developments in TEM and STEM applications.

Committed to global service and support

One point of contact for support is more convenient, cost-effective and frankly more comfortable. As a worldwide organization, FEI can provide you with training and applications support wherever you are. We offer tailor-made customer support packages with agreed response time from our customer service organization that are committed to optimizing performance and value for your investment while getting maximum uptime.

*I view Tecnai G² as a long-term investment
in the future of my organization*