

Ceta 16M

All-in-one camera functionality for the highest performance and throughput

The Ceta™ 16M camera is the first camera to deliver high speed readout for simultaneous dynamic imaging and large field of view. This unique combination follows the natural workflow in TEM imaging: from fast navigation to find the area of interest—to easy optimization of the image quality via optical adjustments—to the final result: a 4k × 4k image unrivaled in quality and detail.

All-in-one camera

The FEI Ceta 16M camera is the first to combine speed and high sensitivity with a large field of view to allow navigation, optimization and high quality imaging functions from a single camera. This eliminates time consuming retraction and insertion of multiple cameras, and compensation for the resulting changes in illumination and magnification, providing easier and more accurate operation with faster time-to-data. Additionally, because the sample's exposure to the electron beam is reduced, potential damage to the sample is minimized.

Superior performance for faster answers

Ultimate imaging performance and robustness in all applications is assured with the Ceta 16M. The large 6 × 6cm², 4k × 4k CMOS sensor with 14μm pixel size is combined with a high sensitivity scintillator. The flexibility to adapt to any high tension setting delivers superior images from any material. The instant-zoom feature enables operators to quickly see features of interest on the screen with the power of 16Mio pixel resolution, while direct wiring CMOS sensor technology further enhances rapid time-to-data.

Optimized settings for any application

The Ceta 16M is embedded in the workflow of FEI's new TEM operating software. The software provides optimized camera settings for both still image and movie recording. Easily switch between low and high dose, and even diffraction mode acquisition, at the push of a button. Automatic fast frame adding enables more than 16 bit dynamic range acquisition to extend the use of Ceta 16M into the demanding application space of electron diffraction imaging.

Dynamic imaging

Fast, high quality movie recording is pivotal to understand material kinetics in dynamic microscopy. Ceta 16M's integration in FEI's data acquisition solution* assures acquisition of high quality, 16 bit dynamic range movies at

25fps (512 × 512) and 18 fps (1k × 1k). Ceta 16M sensor minimizes the beam induced effects, even under high speed acquisition, by requiring <1% minimum overhead time, in comparison to the much longer times required with classical CCD sensors. Ceta 16M has the flexibility to acquire images at highest signal to noise ratio per frame, or at lower dose for beam sensitive materials.

KEY BENEFITS

Easiest, fastest operation: Push-button mode switch functions and fast 4k × 4k CMOS based sensor assure rapid access to the highest quality images.

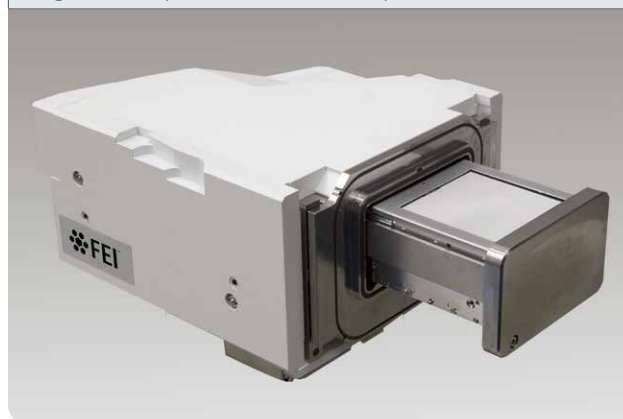
Consistently clear images, from mesoscopic to atomic scale: Largest field of view combined with high speed readout delivers clear images quickly, even when moving from mesoscopic to atomic scales.

Optimum performance at any high tension (20–300kV): High sensitivity, robust fiber optic-coupled scintillator combines with large 14μm pixel size to deliver the best quality images regardless of high tension selection.

Movie acquisition for dynamic studies: Movie recording enables high quality 4k × 4k movies at 1 fps or 512 × 512 movies at 25fps.

Optimized settings for any material or application: Select low dose imaging for beam sensitive materials, or high dose for diffraction applications, with more than 16 bit dynamic range using fast frame-adding

Compatible with post-column filters and spectrometers: The bottom mounted Peltier cooled sensor is positioned on-axis for minimum distortions and retractable, which enables easy integration with post-column filters and spectrometers.



System requirements

Ceta 16M is available on Talos, Titan Themis 200/300 and Titan³ Themis 300.

Ceta 16M Specifications	
Operation voltage	20–300kV
Sensor	4,096 × 4,096, 14μm pixel CMOS
Camera architecture	Fiber optic coupled scintillator (1:1)
Frame rate	4k × 4k 1 fps 2k × 2k 8 fps 1k × 1k 18 fps 512 × 512 25 fps
Imaging performance in 2k × 2k mode DQE @ 0.5 Nyquist MTF @ 0.5 Nyquist	> 8% @300 kV > 12% @200 kV > 25% @300 kV > 35% @200 kV
Detection modes	Triple mode: High sensitivity, high speed, high dynamic range Sampling 1×, 2×, 4×, 8×
Dynamic Range	> 16 bit with fast frame summing
Duty cycle in movie mode	99% in rolling shutter mode
TEM shutter	Pre-specimen, post specimen
Movie mode shuttering	Electronic (rolling shutter) or TEM shutter (camera controlled)
Conversion efficiency	9 counts/primary electron (typical) @200 kV 6 counts/primary electron (typical) @300 kV
Non linearity	<1%
Readout speed	320 Megapixel/s (32 port readout at 10 Megapixel/port)
Cooling	Sensor Peltier cooled when connected to TEM water line
Mounting position	On-axis, bottom mounted, retractable
Computer platform	Windows 7, 64 bit
Network Interface	Gigabit Ethernet
X-ray safety	PTB standard
	Extended dynamic range 18*16-bit in 1s, 1k × 1k imaging

World Headquarters
Phone +1 503 726 7500

FEI Europe
Phone +31 40 23 56000

FEI Japan
Phone +81 3 3740 0980

FEI Asia
Phone +86 21 8012 5200

FEI Australia
Phone +61 2 6173 6200

Learn more at FEI.com
ContactUs@FEI.com

For current certifications, please visit FEI.com/certifications

*Reference specific platform specifications for information on the latest data acquisition software

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