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DATASHEET

Ceta-M

All-in-one camera functionality for highest performance and dynamic imaging

The Thermo Scientific™ Ceta-M™ is a camera solution delivering sensitive as well as dynamic imaging with 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 Ceta-M camera combines high speed recording (up to 40 frames per second at full resolution with the optional speed enhancement) 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-M camera. The large 6 × 6 cm^2, 4k × 4k CMOS sensor with 14 µm 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 16M pixel resolution, while direct wiring CMOS sensor technology further enhances rapid time-to-data.

Optimized settings for any application

The Ceta-M camera is embedded in the workflow of the latest Thermo Scientific 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 the Ceta-M camera into the demanding application space of electron diffraction imaging.

Key Benefits

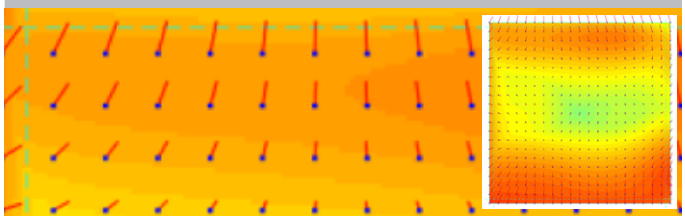
Consistently clear images: From mesoscopic to atomic scale: Largest field of view with 4kx4k sensor combined with lowest distortion gradient (0.5%) and high speed readout delivers clear mages quickly, for ultra precise metrology from mesoscopic to atomic scales.

High performance at any accelerating voltage (30–300 kV): High sensitivity, robust fiber optic-coupled scintillator combines with large 14 µm pixel size to deliver the high quality images regardless of accelerating voltage selection.

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.

Movie acquisition for dynamic studies: The optional "speed enhancement" solution enables recording of high quality 4k × 4k movies at up to 40 fps (standard 1 fps) or 512 × 512 movies at up to 300 fps (standard 25 fps) with full integration in Thermo Scientific Velox software.

Data storage: The optional speed enhancement (with analysis computer or storage server) solution enables capture, storage and transfer of TB file size movie recordings.



Distortion measurements are taken from a matrix of 17 x 17 points and converted into a 2D distortion vector field. The gradient map of this vector field denotes the change in size of a feature, across the field of view. The difference between the minimum and maximum is the "Distortion gradient". Wherever a feature is measured the dimensions are within this accuracy, in any direction.

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Dynamic imaging

Fast, high quality movie recording is pivotal to understand material kinetics in dynamic microscopy. The camera's integration in our data acquisition solutions* assures acquisition of high quality, 16 bit (with frame summing) dynamic range movies at 1 fps with 4k × 4k pixel resolution (with optional speed enhancement: up to 40 fps) and, e.g., 25 fps with 512 × 512 pixel resolution (with optional speed enhancement: up to 300 fps).

Sophisticated data management with the optional speed enhancement enables handling of TB data files and therefore movie recording of at least 40 minutes in full resolution 4k mode.

System requirements

The Ceta-M camera is available on the Spectra and Talos and Metrios platform. For retrofits please contact your local service and sales organization to check for hardware and software compatibilities.

Ceta-M Camera specifications		
Operation voltage	30–300 kV	
Sensor	4,096 × 4,096, 14 µm pixel CMOS	
Camera architecture	Fiber optic coupled scintillator (1:1)	
Recording frame rate	**Standard:** 4k × 4k 1fps 2k × 2k 8 fps 1k × 1k 18 fps 512 × 512 25 fps	**Speed enhancement:** 4k × 4k 40 fps 2k × 2k 80 fps 1k × 1k 160 fps 512 × 512 300 fp
Imaging performance in 4k ×4k mode DQE @ 0.5 Nyquist MTF @ 0.5 Nyquist	>9% @300 kV; >9%@200 kV >16%@300 kV; >17%@200 kV	
Detection modes	Triple mode: Low dose, Medium dose, High dose Sampling 1×, 2×, 4×, 8×	
Dynamic Range	>16 bit with fast frame summing	
Duty cycle in movie mode	100% in rolling shutter mode	
TEM shutter	Pre-specimen, post specimen	
Movie mode shuttering	Electronic (rolling shutter) or TEM shutter (camera controlled)	
Conversion efficiency	7 counts/primary electron (typical) @200 kV 5 counts/primary electron (typical) @300 kV	
Non linearity	<1%	
Distortion gradient	≤ 0.5%	
Cooling	Sensor Peltier cooled	
Mounting position	On-axis, bottom mounted, retractable	
Computer platform	Windows® 10, 64 bit	
Network Interface	**Standard:** Gigabit Ethernet	**Speed enhancement:** 10 Gigabit Ethernet to Storage Server/Analysis PC 1 Gigabit Ethernet to TEM PC
Data management and storage	**Standard:** HD space of microscope PC	**Speed enhancement:** 4 TB SSDs on electronic board 4 TB storage in analysis PC (optional) 66 TB data storage server (optional)
X-ray safety	96/29/EURATOM - Ionizing Radiation	

Find out more at **thermofisher.com/EM-Sales**

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