DE-12 Camera System

versatile and economical direct detector

Direct Electron delivers | bigger | better | faster | cameras for electron microscopy

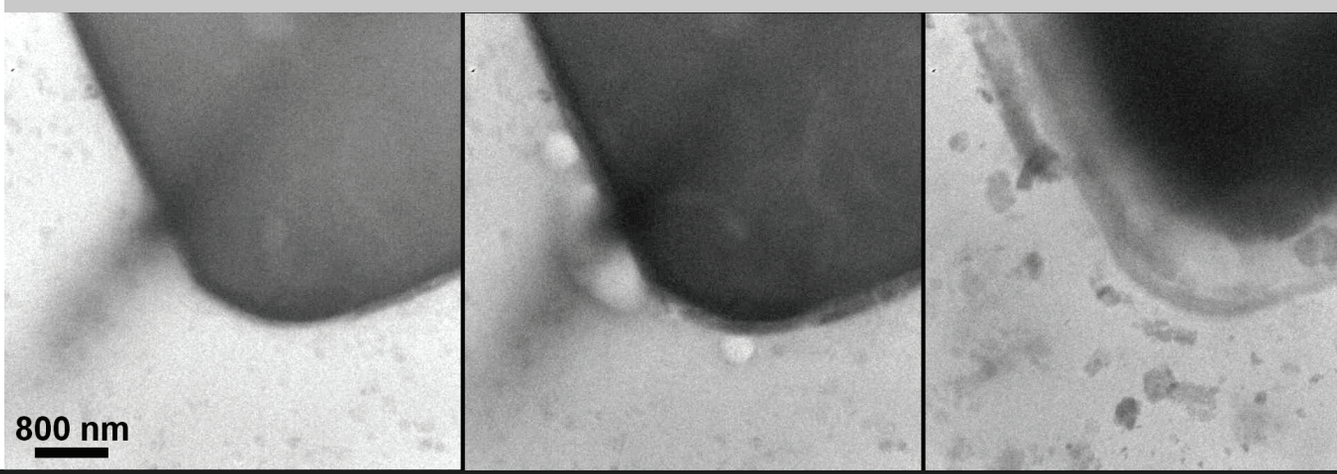
Direct Electron®
INNOVATION PROPELLING DISCOVERY

Better Science, Faster – Brilliant Results in Less Time

- Direct detection device (DDD®) delivers ***high resolution and excellent sensitivity***.
- ***4k × 3k*** (12.6 million) pixels.
- Ideal for in situ TEM, materials science, and energy-filtered TEM with a high dynamic range and ability to ***collect very long exposures***.
- ***High-speed*** continuous streaming for "movie-mode" processing (e.g., motion correction) and continuous-tilt tomography.
- ***Open-source software***.
- ***Unrivaled features***: integrated Faraday plate for exposure measurement.
- Versatile for a broad range of applications from cryo-EM, to STEM, to DTEM, to in situ TEM.
- Low total cost-of-ownership and exceptional support.

Microscopy TODAY Innovation Awards

In situ TEM experiment with an electrochemical liquid cell, showing dissolution of an electrode.
Data was collected at 75 frames per second (fps). Courtesy of Haimei Zheng, Lawrence Berkeley National Lab.
Published in Zeng, et al., *Faraday Discuss* 176 (2014).



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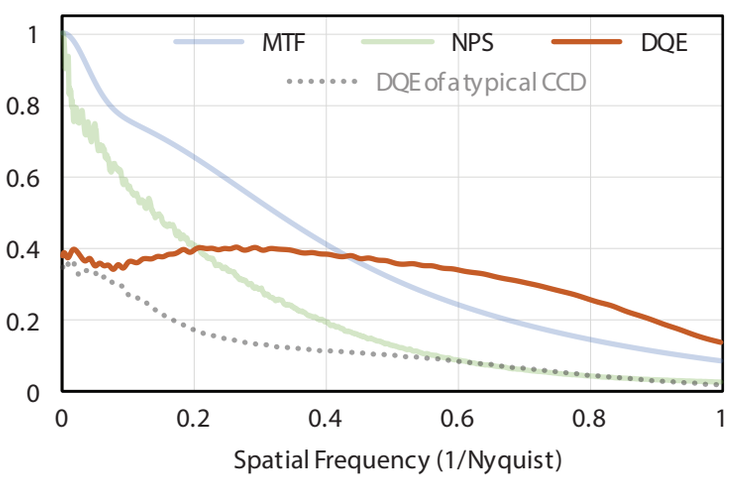
detection electron energy	optimized for 80 keV – 1.25 MeV
pixel array specification	4096 × 3840 (12.6 million pixels) | 6.0 µm pixel pitch
single electron SNR	~20:1 (200 kV)
sensor design	>3T pixel design with correlated double sampling (CDS) | backthinned | radiation hardened
acquisition frame rate	40 fps max, unbinned full-frame | 75 fps, bin 2× full-frame subarray readout up to 960 fps max
acquisition modes	integrating mode | counting mode (with optional counting system)
exposure rate	large dynamic range with consistent performance in integrating mode (e.g., 4 – 800 e-/pixel/s)
mounting position	fully retractable | mounted on-axis TEM bottom port or in JEOL film drawer
"buddy" camera	optional additional 2k × 2k fiber-coupled CCD camera
exposure measurement	integrated Faraday plate for exposure measurement with each acquisition
sensor protection	integrated physical protection shutter | microscope blanking/shuttering | failsafe software
computer system	certified high-performance computer system with large >12 TB RAID array for data streaming
image format	image data stored in non-proprietary format to ensure broad compatibility
acquisition & processing software	*conventional acquisition*: DE-IM (full-featured, user-friendly) | µManager (free, open-source) *in situ movie acquisition*: DE-StreamPix (continuous streaming) *automated acquisition*: Leginon | SerialEM | EMTools (TVIPS) | others using the DE SDK *"movie" processing*: DE image processing software (free, open-source, Python-based) | others *customization*: software development kit (SDK) for integration with custom software

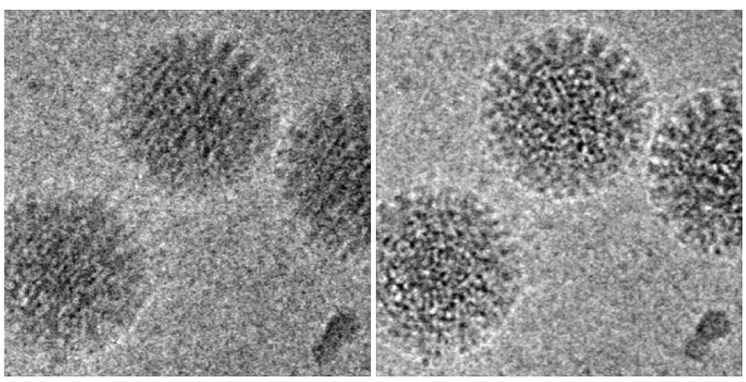
Integrating Mode

best for maximizing overall productivity



A region containing Rotavirus DLP particles before (left) and after (right) motion correction. Published in Brilot et al., J. Struct. Biol., 2012.

raw image | motion corrected



* Note: Specifications and performance are subject to change.

there is much more...

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