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Talks**
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"A Brief Introduction of Two New TEM's at the BioCryo Core"



July 20, 2023
11:00 AM CST

Join us as
Dr. Reiner Bleher
BioCryo Facility Manager
presents a live Zoom talk!

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** Registrants will receive a Zoom link to access the talk via email*

Northwestern
Exploring Inner Space



22 years of Excellence...

New BioCryo TEM: JEOL 1400 Flash



- LaB₆ emitter
- 120 kV and lower acceleration voltage at 100V increments.
- High resolution (HR) mode imaging with 0.27 nm (lattice) and 0.38 nm point resolution at 120 kV.
- Suitable for RT imaging and for cryo-TEM of plunge frozen samples.
- Gatan model 626 and Elsa cryo transfer holder for cryo-TEM.
- Gatan OneView camera (15 μ m pixel size!).
- **Location: Silverman Hall B530A.**
- JEOL 1400 manual is available in [NUCore](#) under the Docs tab.

New BioCryo TEM: JEOL 1400 Flash



Gatan OneView Camera

Benefits

- **4096 x 4096, 15 μm pixels:** Large, high-resolution field of view
- **CMOS sensor with built-in shutter:** Near 100% duty cycle data acquisition maximizes signal-to-noise and optimally uses specimen dose
- **25 full frames per second:** No need to compromise resolution for speed, always have a “live” experience at full resolution
- **In-line data processing:** Guarantee optimal image quality with real-time drift correction and outlier removal and extend dynamic range beyond 16-bits

New BioCryo TEM: JEOL 1400 Flash

OneView Camera, Model 1095

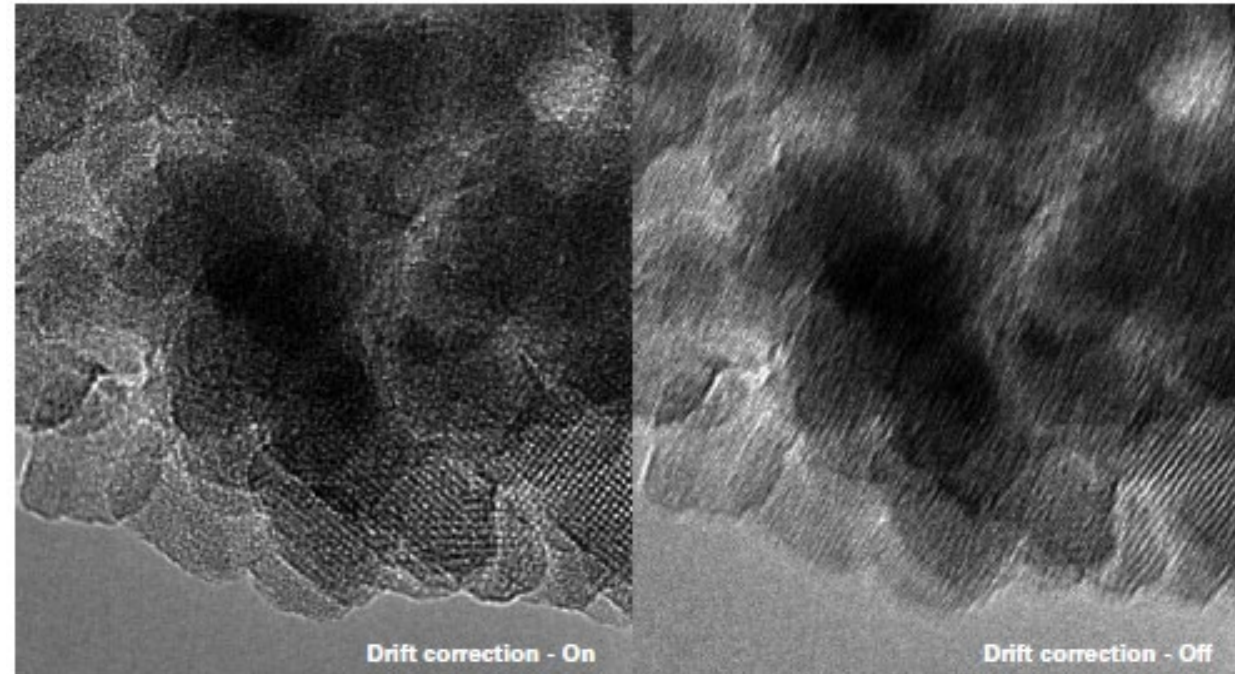
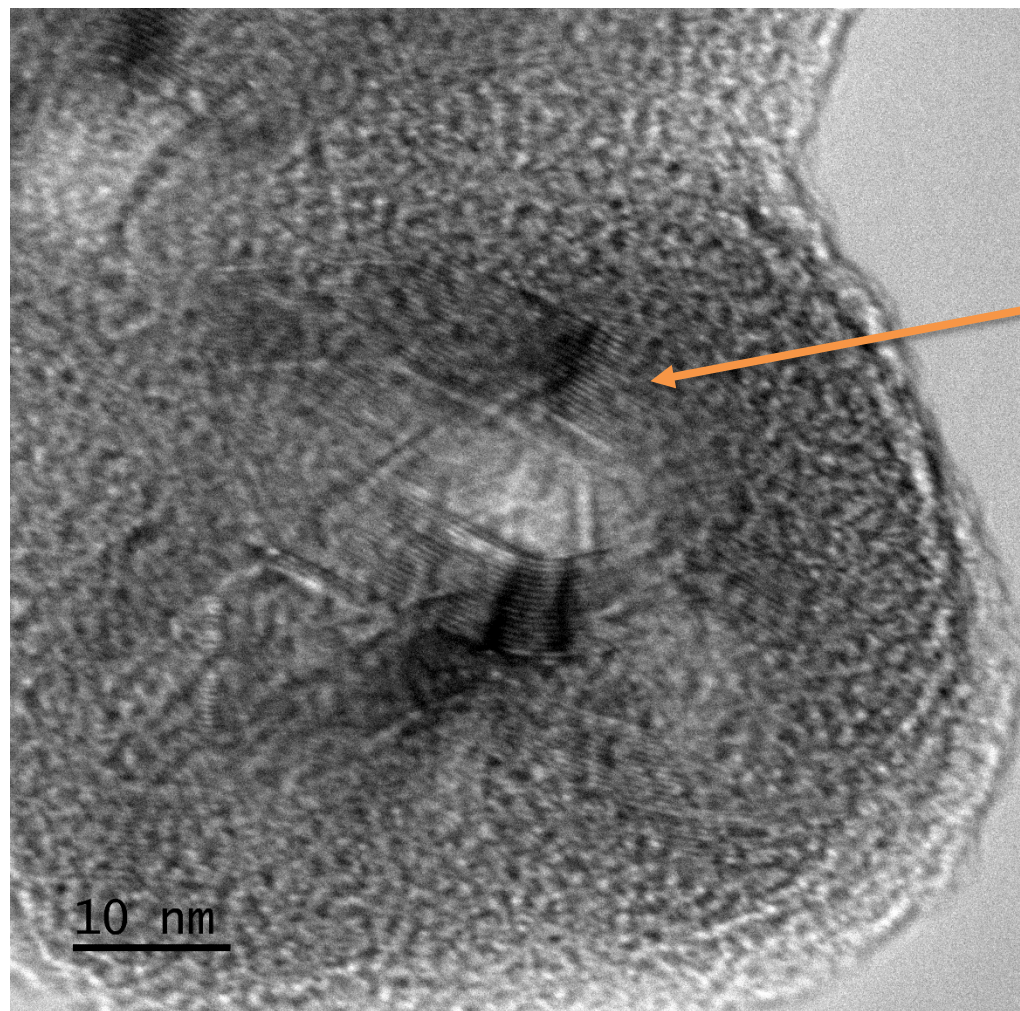


Figure 1. Demonstrating the drift correction capabilities of the OneView camera, and the ability to capture high quality 16 megapixel still images and video. Image of zeolite sample captured with OneView camera; electron energy: 120 kV; TEM indicated magnification: 10 kx; image size: 4k x 4k; exposure time: 1 s; number of frames: 25. *Sample courtesy of Chevron, zeolite SSZ-57.*

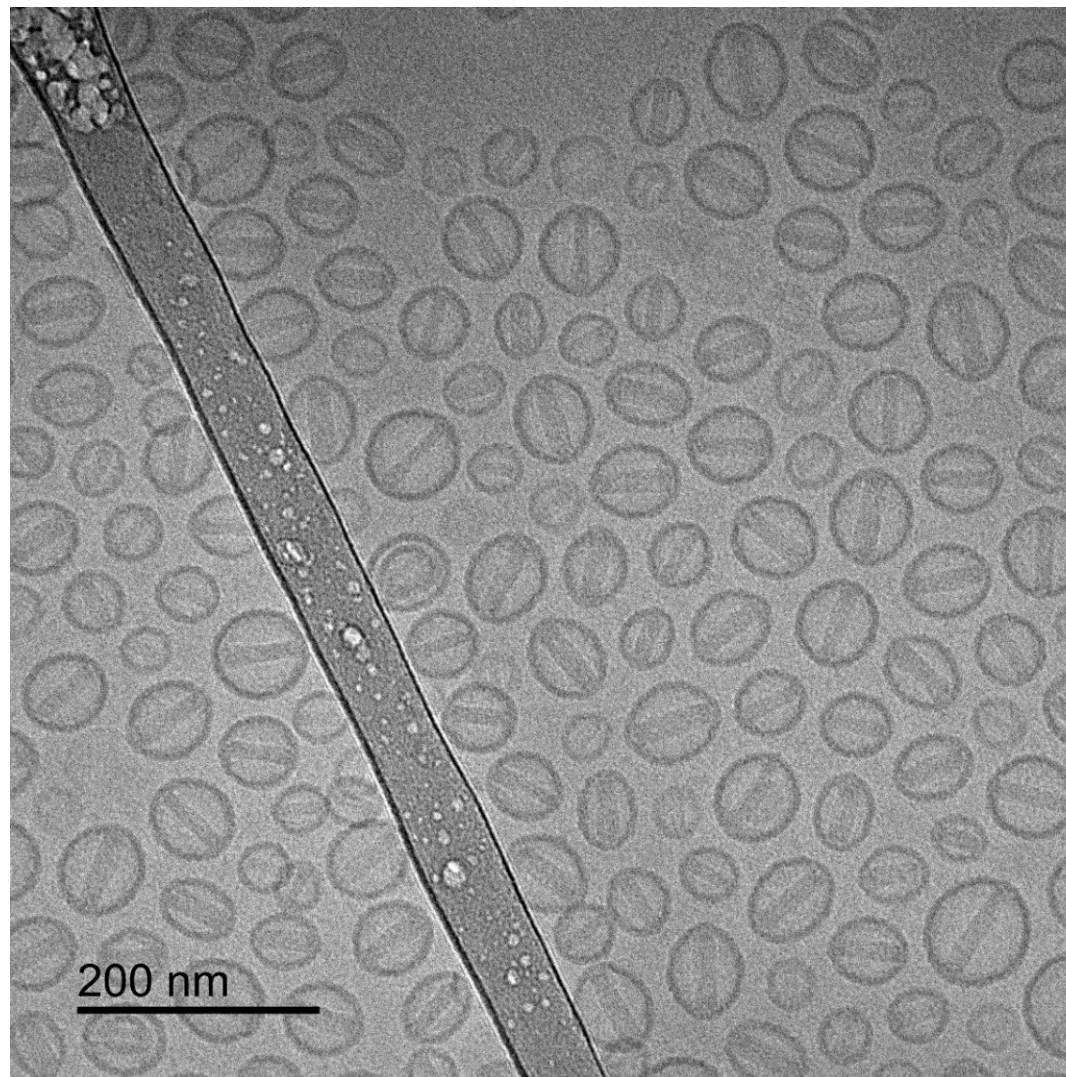
New BioCryo TEM: JEOL 1400 Flash



0.3 nm lattice of calibration sample

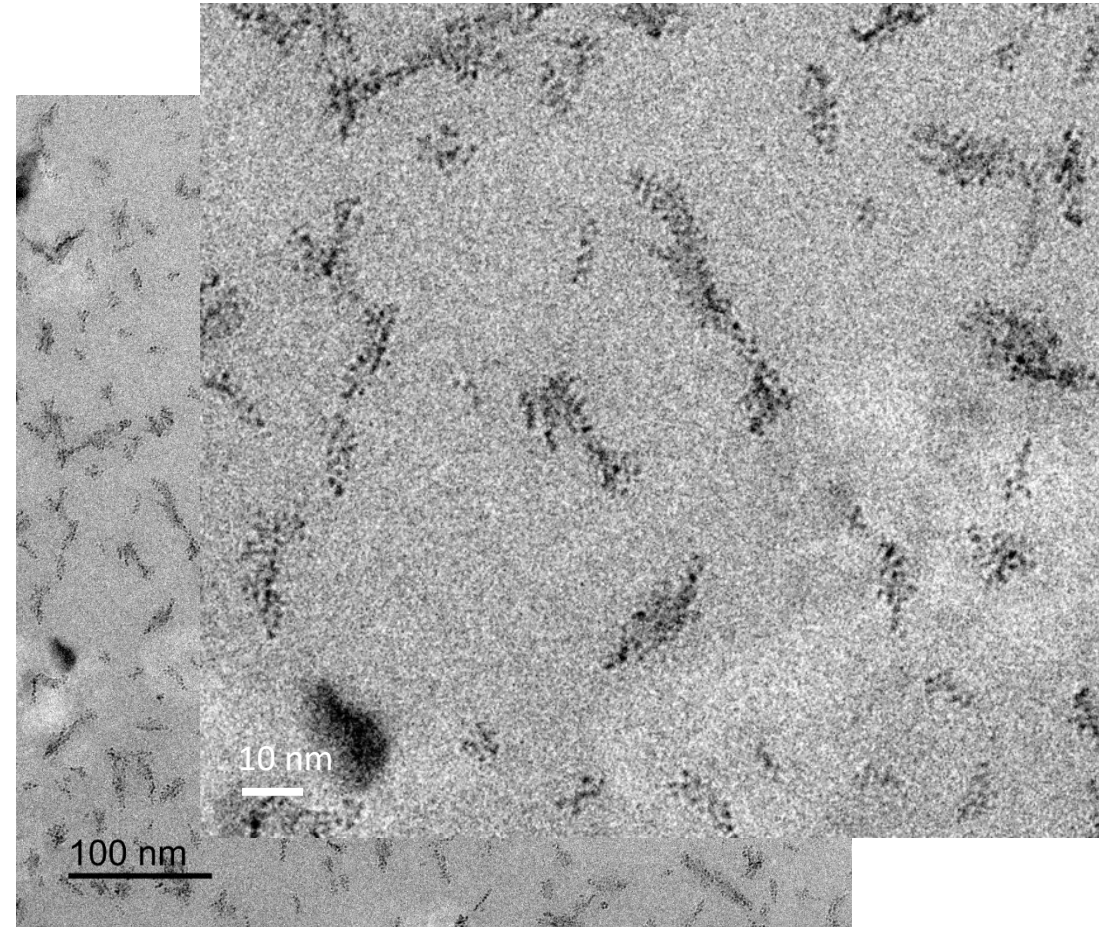
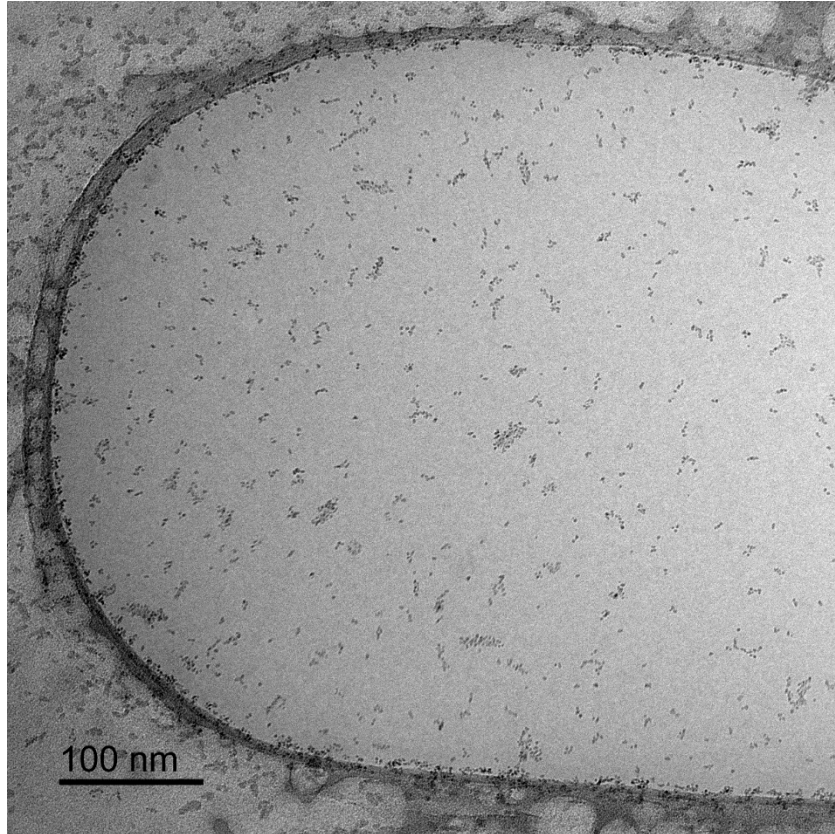
New BioCryo TEM: JEOL 1400 Flash

Cryo-TEM image of a plunge frozen drug-carrier sample



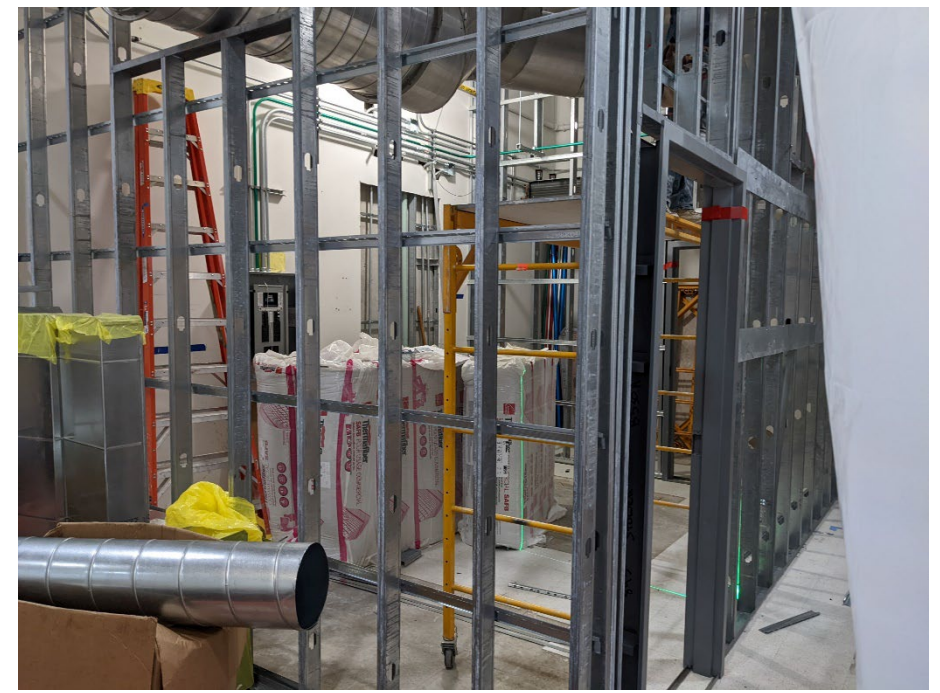
New BioCryo TEM: JEOL 1400 Flash

Cryo-TEM image of plunge frozen NP aggregates



New BioCryo TEM: JEOL 1400 Flash

Construction of TEM room B530A in Silverman B530



New BioCryo TEM: JEOL 1400 Flash

1400 TEM in Silverman B530A



Bench with PC, Vitrobot, DPS and CTHs in B530



New BioCryo TEM: JEOL 1400 Flash

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- **Contact: 1. Eric Roth, 2. Reiner Bleher**



New BioCryo TEM: JEOL 3200FS TEM



- FEG (Schottky)
- 300 kV acceleration voltage
- 0.22 nm TEM resolution
- In-column energy filter
- Gatan K2 Summit direct detector
- Gatan 626 cryo transfer holder
- Fischione dual tilt axis holder model 2040
- **Location: Tech AB, room AG 78**
- JEOL 3200FS manual is available in [NUCore](#) under the Docs tab

New BioCryo TEM: JEOL 3200FS TEM

AMETEK Gatan K2 Summit Direct Electron Detector



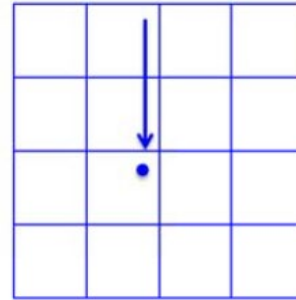
New BioCryo TEM: JEOL 3200FS TEM

Gatan K2 imaging modes

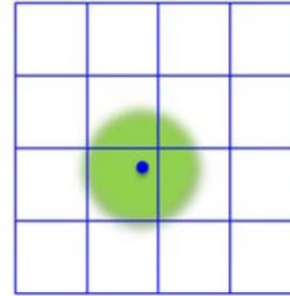


Direct Electron Detector

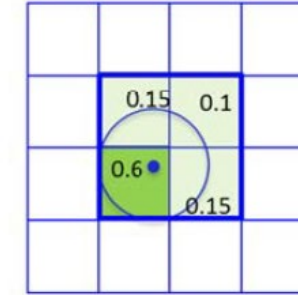
1. Electron enters detector



2. Signal is scattered



3. Charge collects in each pixel

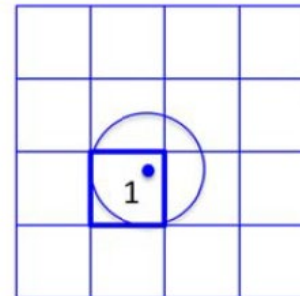


Linear mode

K2 Base: Charge Integration

Improved DQE at high Frequency

4. Events are reduced to the highest charge pixels

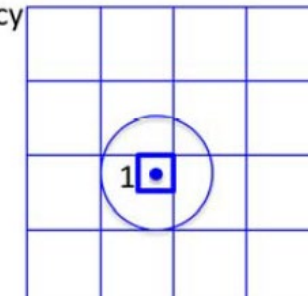


Counted mode

K2 Summit: Counting

Improved DQE at low AND high Frequency

4b. Events are localized with subpixel accuracy



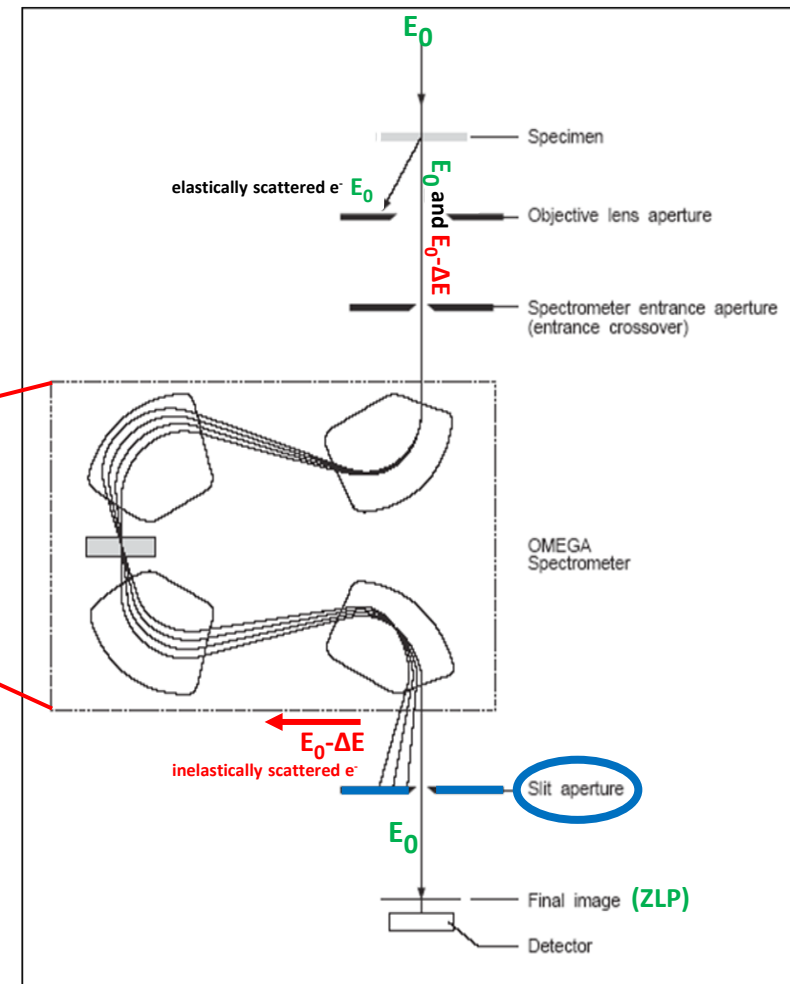
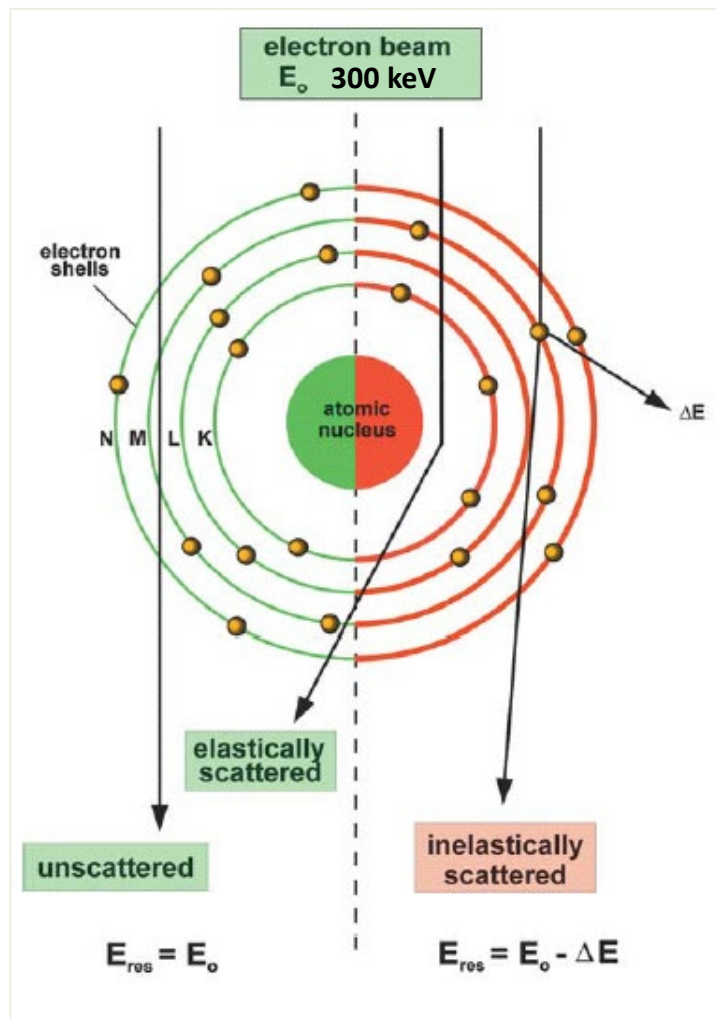
Counted SR mode

K2 Summit: Super-Resolution

Improved DQE at low AND high Frequency and **7680 x 7424** pixels

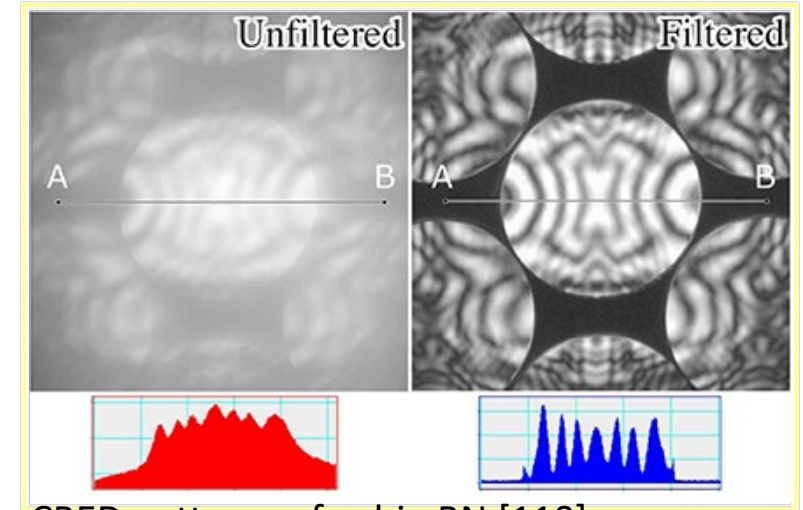
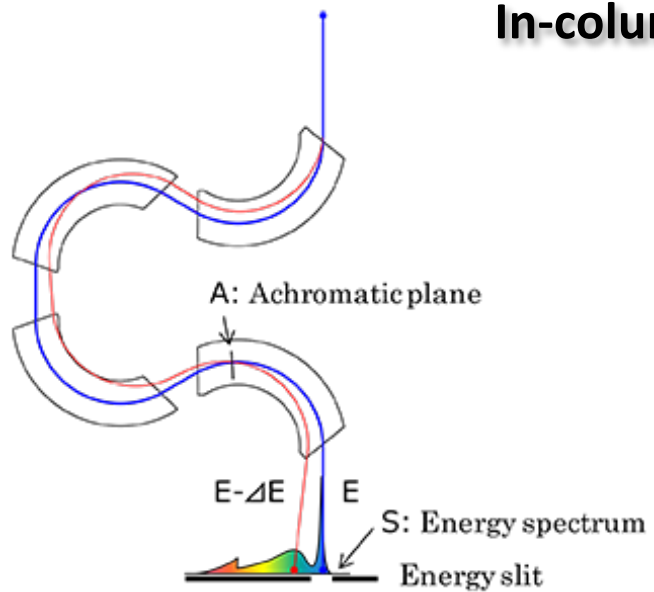
New BioCryo TEM: JEOL 3200FS TEM

In-column energy filter (Ω Filter)

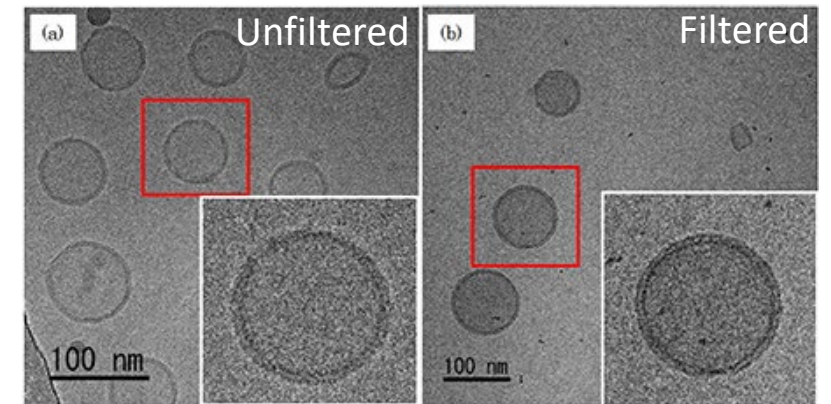
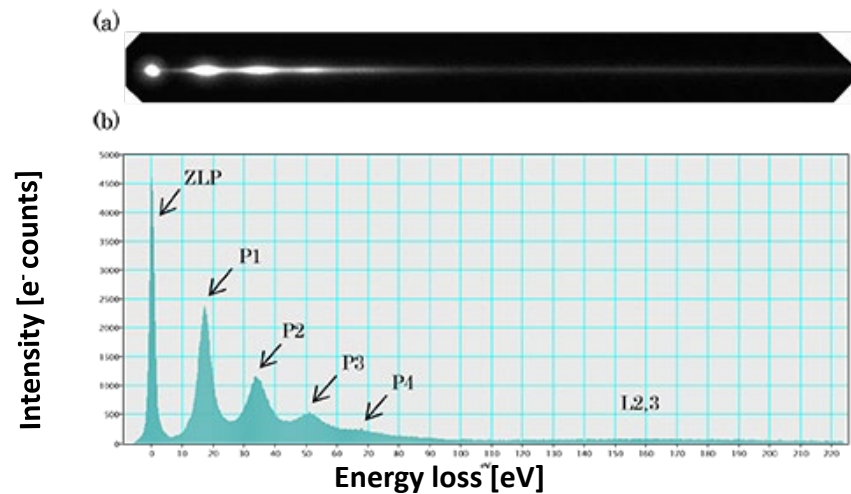


New BioCryo TEM: JEOL 3200FS TEM

In-column energy filter (Ω Filter)



CBED patterns of cubic-BN [110]

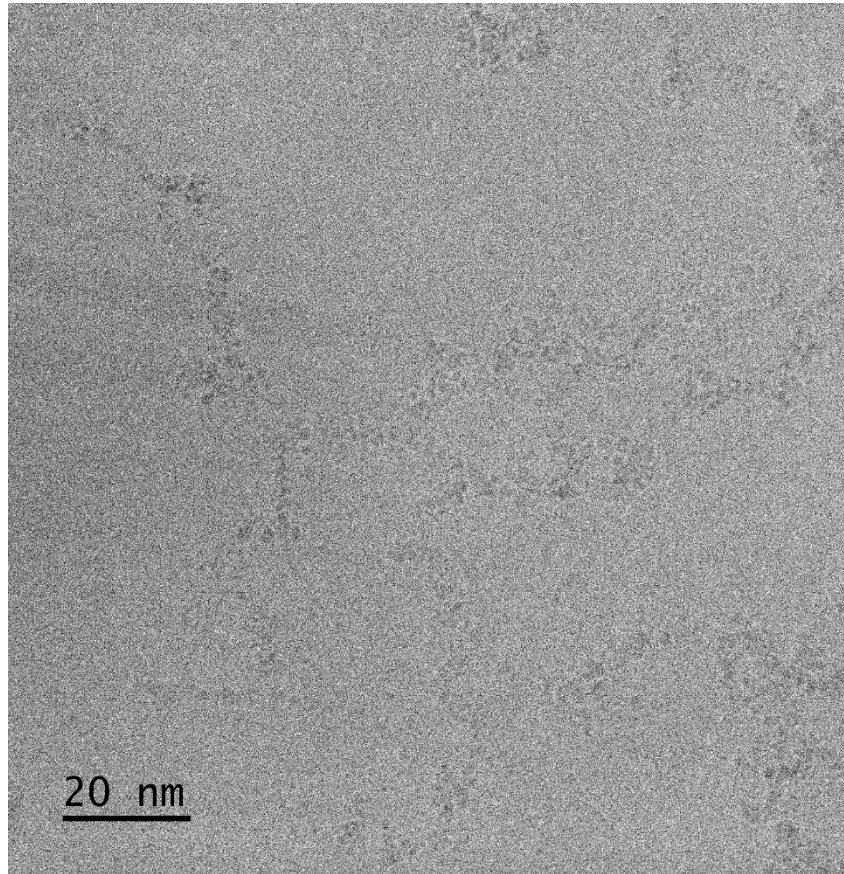


Cryo-TEM of liposomes

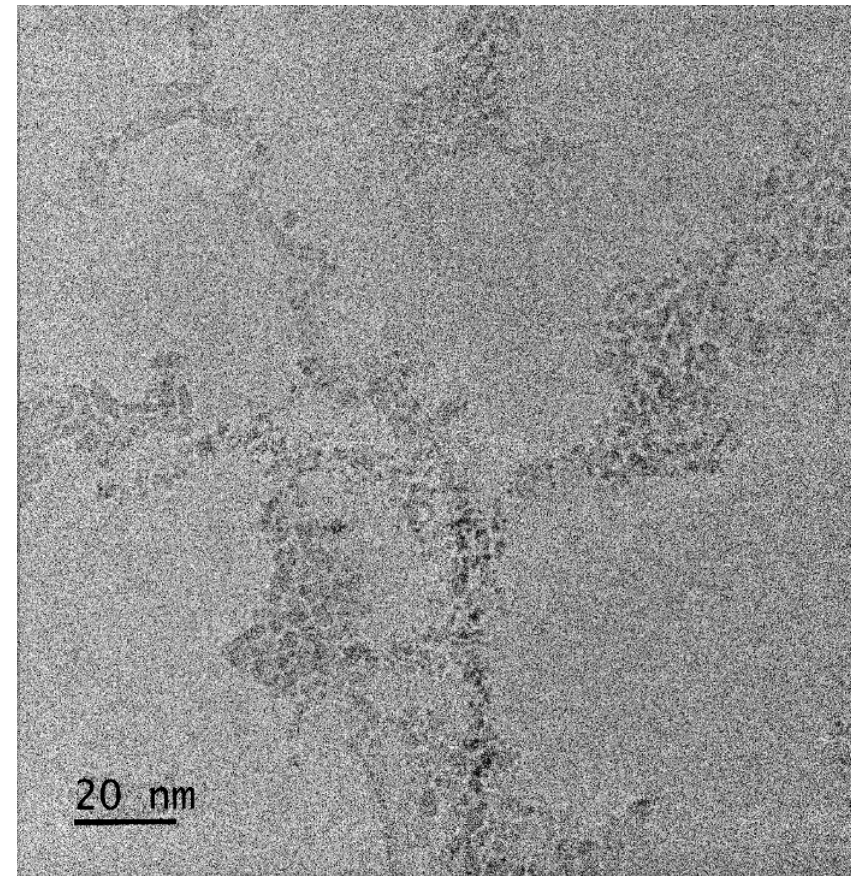
New BioCryo TEM: JEOL 3200FS TEM

Cryo-TEM of lipoprotein nanoparticles

without energy filter

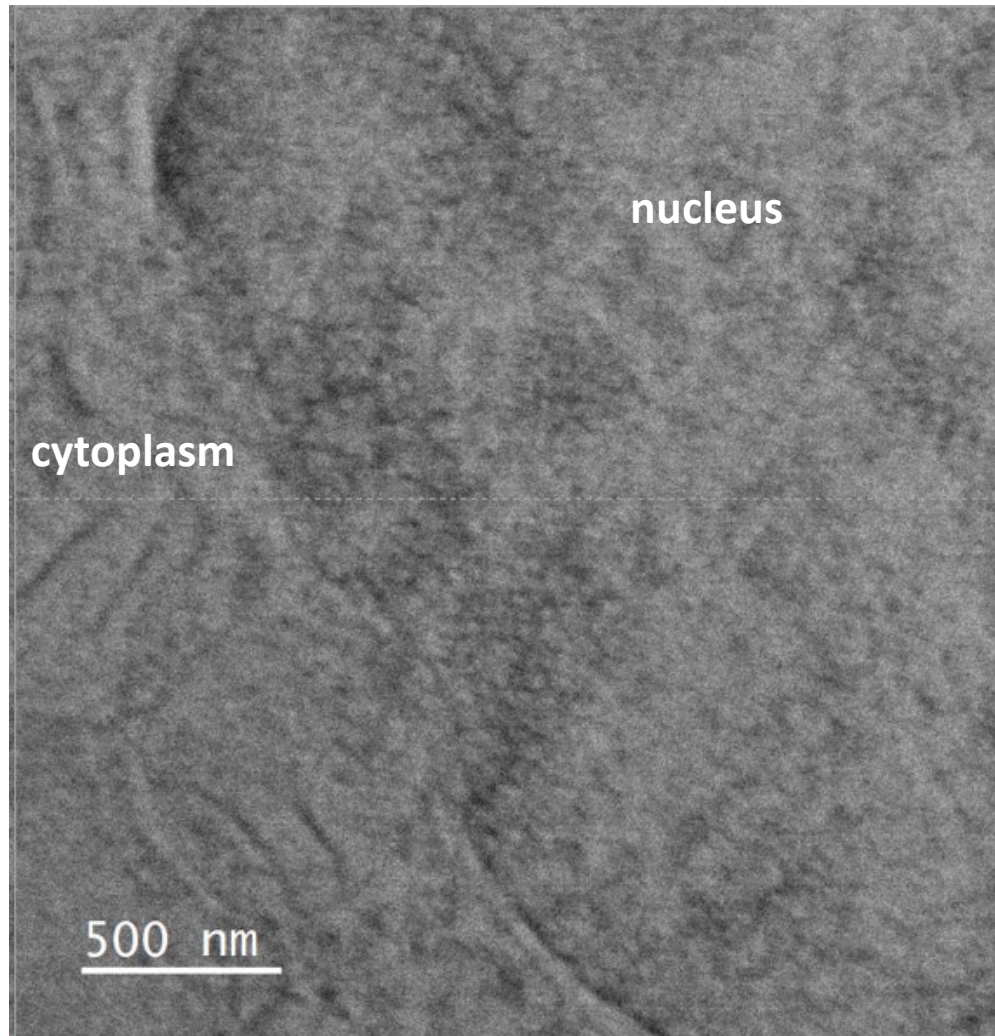


with energy filter (ZLP)

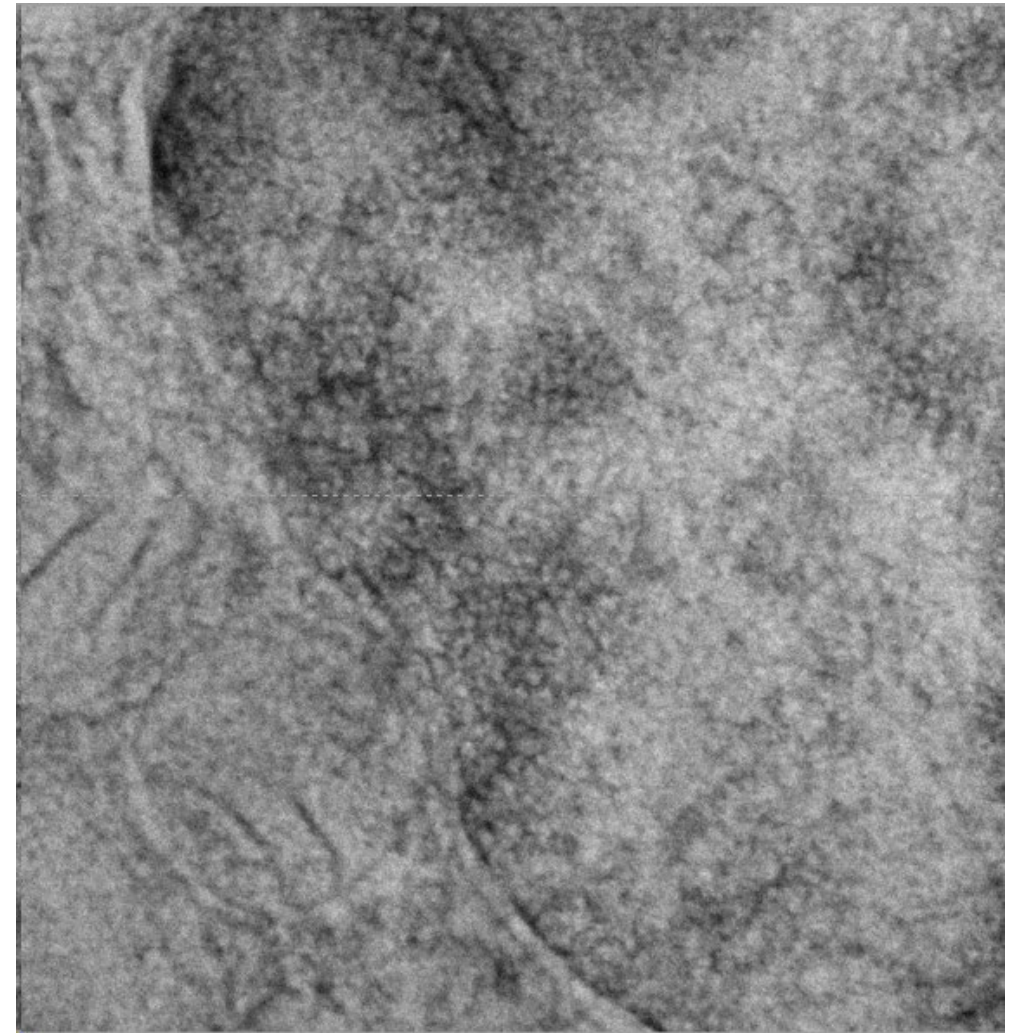


New BioCryo TEM: JEOL 3200FS TEM

without energy filter



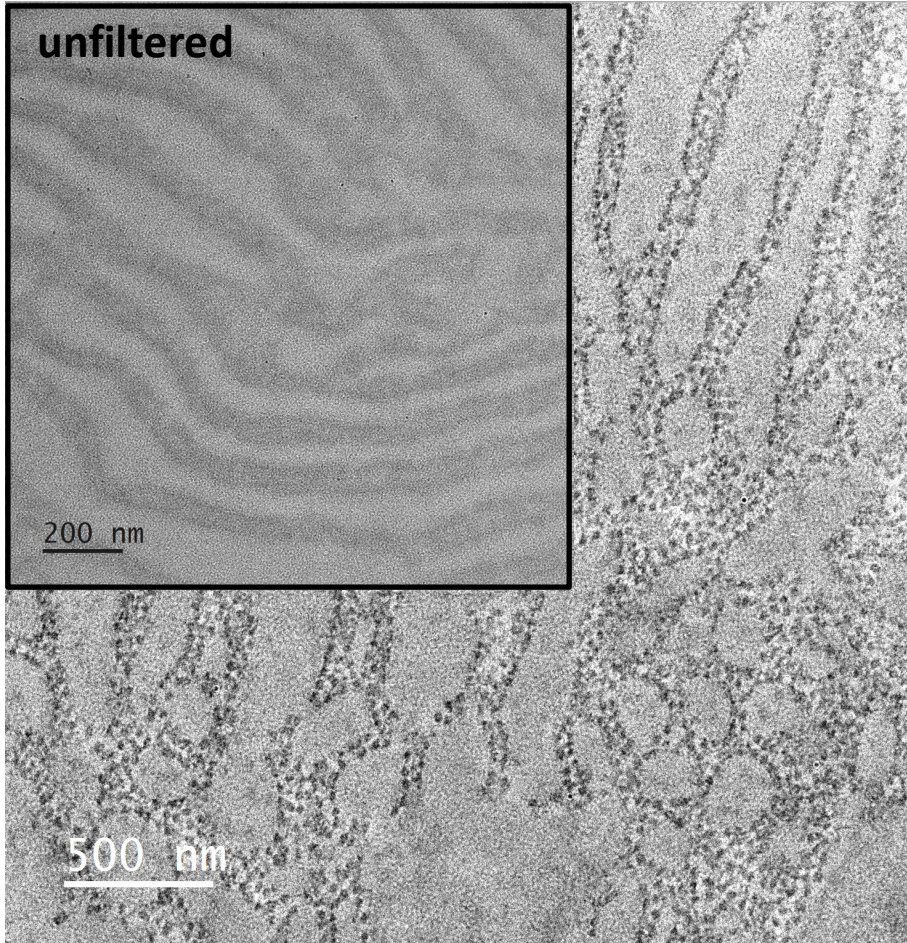
with energy filter (ZLP)



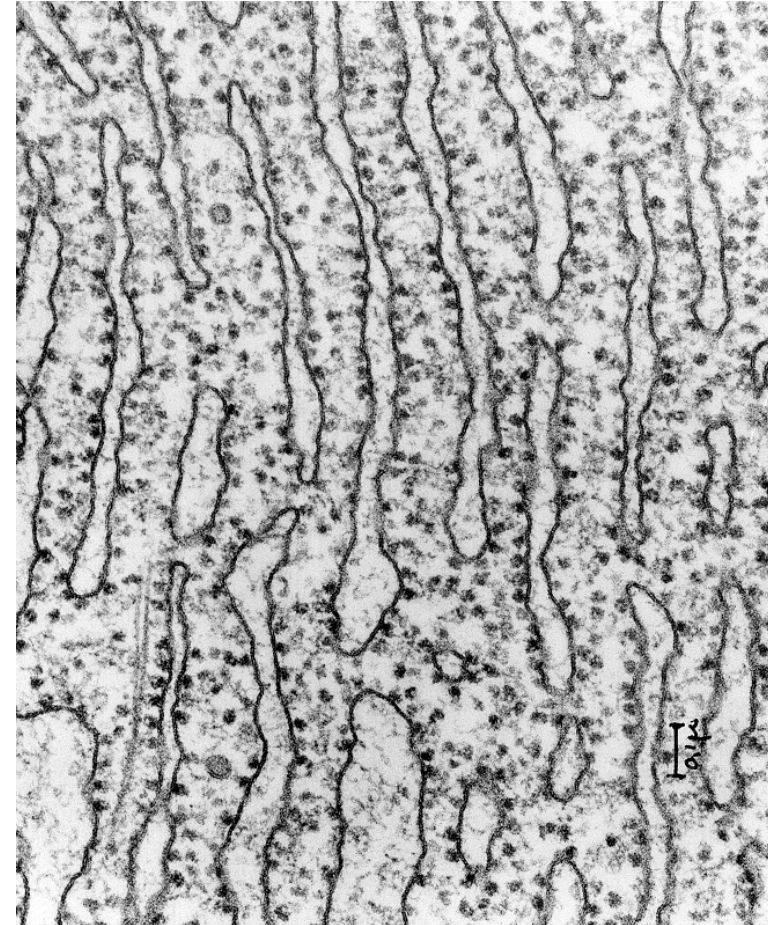
Part of a nucleus (nu) and cytoplasm (cyt) of a HeLa cell in a **500 nm thick** resin section. RB

New BioCryo TEM: JEOL 3200FS TEM

Ribosomes on rER of resin embedded pancreatic cell



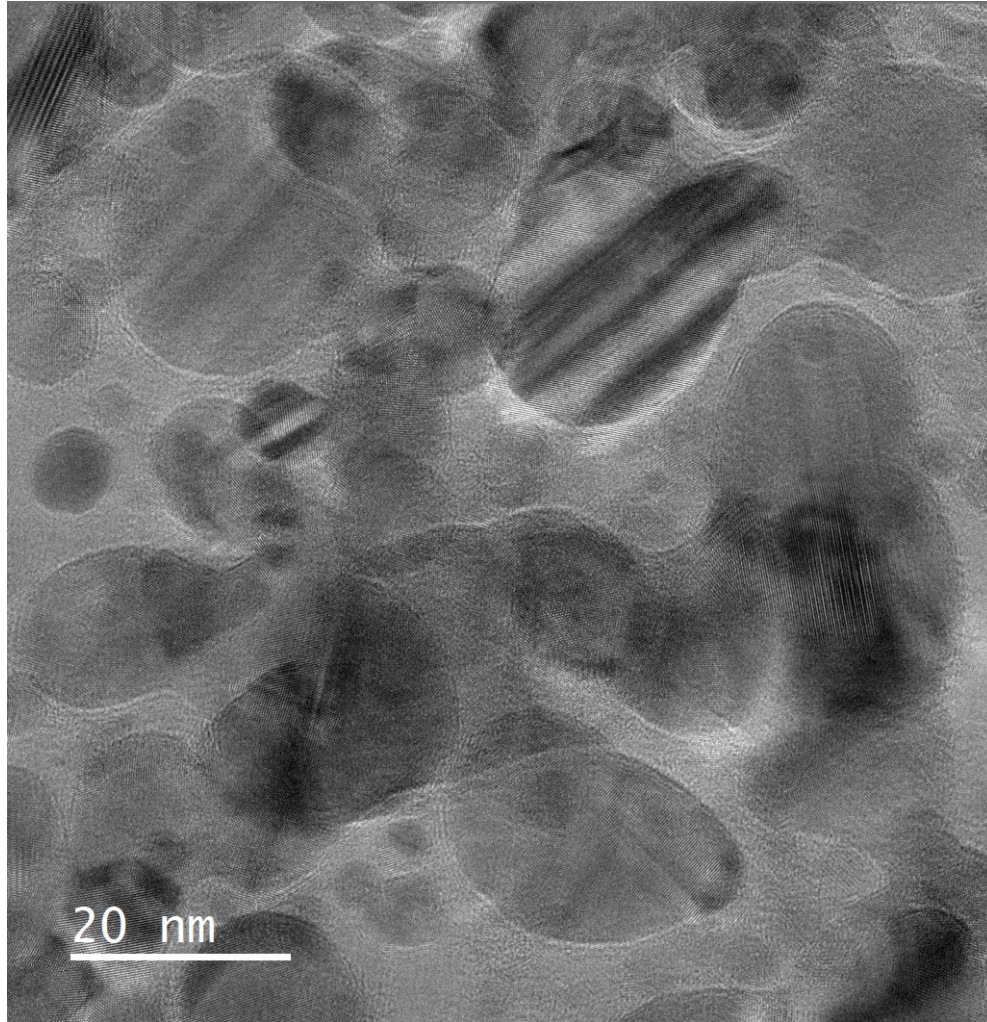
ZLP image of rER in an unstained, resin embedded pancreatic cell. 50nm thick section.



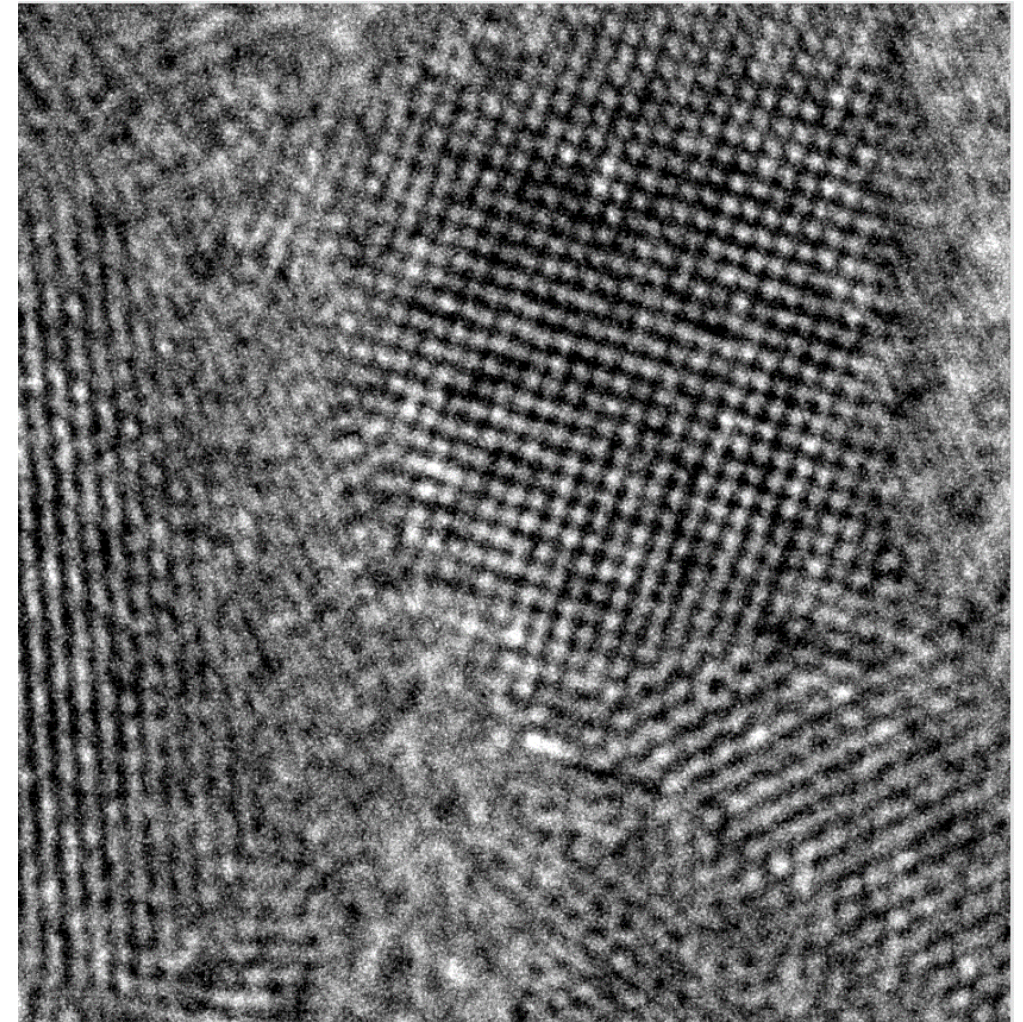
Osmium tetroxide fixed, resin embedded pancreatic cell. 50nm thick section.

Image source - bio.libretexts.org
Credit DON W. FAWCETT / SCIENCE SOURCE / SCIENCE PHOTO LIBRARY

New BioCryo TEM: JEOL 3200FS TEM



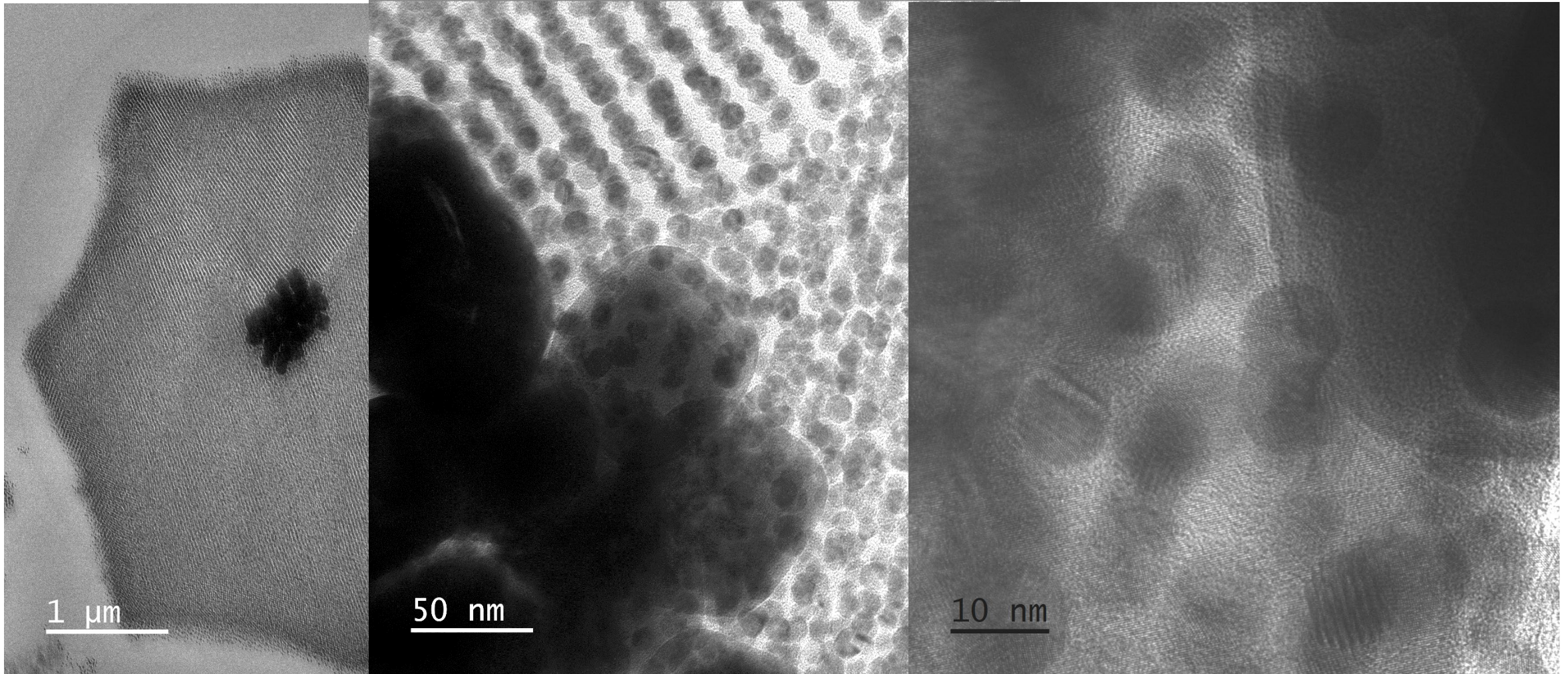
Calibration sample



Au NP, atoms are visible. The diameter of a gold atom is approximately 0.16nm

New BioCryo TEM: JEOL 3200FS TEM

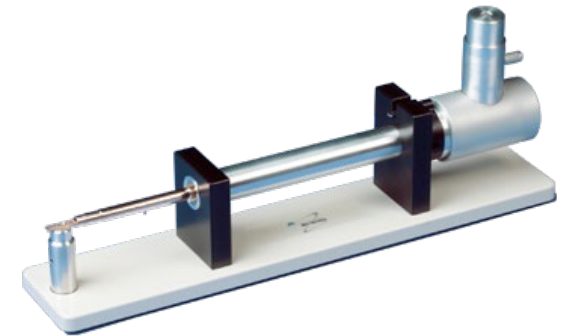
Resin sections of cubic seed nanoparticles that are used to form crystals from Au NPs and DNA



Sample: Rachel Chan, Mirkin Lab, Institute for Nanotechnology.

New BioCryo TEM: JEOL 3200FS TEM

- 300kV Schottky FEG
- In-column energy filter (Omega type)
- Direct electron detector (Gatan K2 Summit)
- Suitable for:
 - Thicker samples (ET)
 - Cryo TEM
 - In situ TEM
 - Low contrast samples
- Dual axis tilt holder
- Cryo transfer holder
- **Location: Tech AB, room AG78**
- JEOL 3200FS manual is available in [NUCore](#) under the Docs tab
- Contact: 1. Reiner Bleher, 2. Eric Roth



Proper Handling of TEM Sample Holders

- Wear gloves
- **Always** bring the goniometer to the neutral position before removing or inserting a sample holder
- **Always** check the pin!!
A loose pin will damage the airlock/goniometer
- **Always** move the sample holder along the horizontal axis of the goniometer
- Ask us if you need a refresher on the inserting/removal procedure



Thanks for your Attention!

Questions?



JEOL 1400



JEOL 3200FS

Contact

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