

Advanced Research Equipments: CryoEM & Transmission Electron Microscope for Life Science and Material Science

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ASEAN-Japan Joint Workshop on
“The current situation and challenges concerning the development of research
environments for advanced research equipment, etc. between Japan and
ASEAN countries”
Jakarta, 24 February 2023



Cryo Electron Microscope (CryoEM) for Life Science

2022



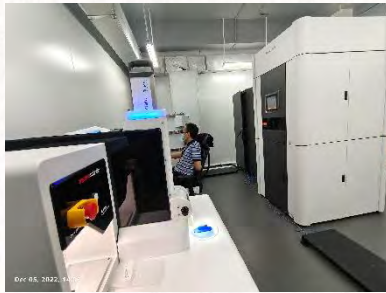
Aquilos Cryo FIB SEM



Talos F200C



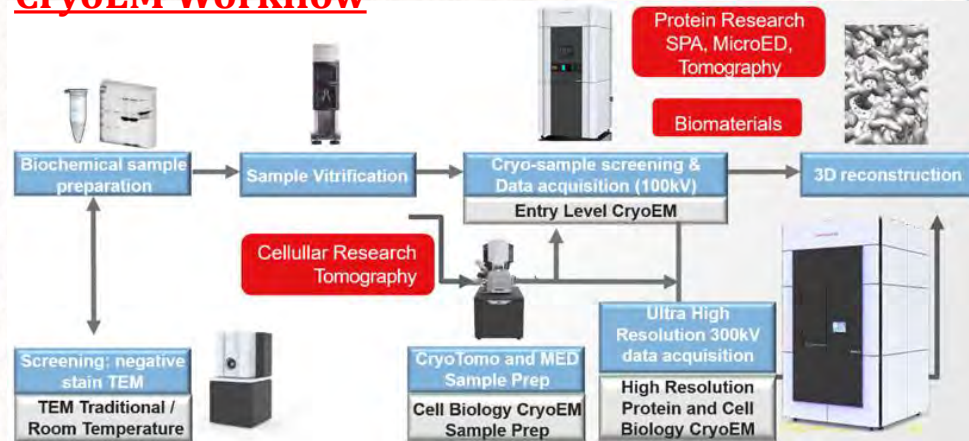
Krios G4 Cryo-TEM



Tundra Cryo-TEM

1. CryoEM-Dual Beam (FIB) for TEM Sample Preparation
2. TEM for Life Science Analysis in Room Temperature
3. CryEM-TEM for Sample Screening
4. CryoEM-High Resolution Transmission Electron Microscope (HRTEM)

CryoEM Workflow



Transmission Electron Microscope (TEM) for Material Science

1. Transmission Electron Microscope with HR(S)TEM and Spectroscopy (EDS & EELS Capabilities)
2. Transmission Electron Microscope (TEM)
3. Dual Beam (FIB) for TEM Sample Preparation

Features: TEM imaging, HRTEM, STEM, HRSTEM, EFTEM, SAED, HREDX, EELS, ASTAR orientation mapping, Insitu Observation (heat and biasing), Tomography

Applications: Nanomaterials, energy materials, high temperature materials, soft magnetic materials, etc.



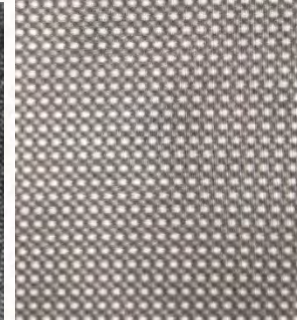
**Talos F200X + EDS + EELS
(2022)**



**Tecnai G2 20S-Twin
(2013)**



HRTEM



HRSTEM



**JIB-4610F + EDS + EBSD
(2016)**

Advanced Research Equipments

- Wind Tunnels
- High Resolution Powder Diffractometer (HRPD)
- Residual Stress Diffractometer (RSD)
- Small Angle Neutron Spectrometer (SANS)
- Nuclear Magnetic Resonance (NMR)
- Electromagnetic Compatibility (EMC)
- etc.

Laboratories:

- Biosafety Level 3 (BSL-3) Laboratory
- Center Laboratory of Sequencing, etc.

<https://elsa.brin.go.id>



Wind Tunnels



HRPD



NMR Ascend™ 700

Difficulties and Problems

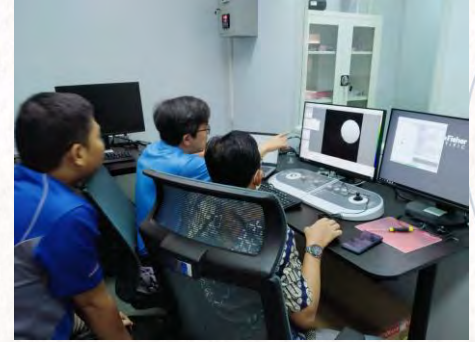
- **Human resources:** Experienced operator and scientist → Advanced trainings and practice
- **Difficulties in shared use:** Limited information for research facilities including characterization equipments → **Solution:** Open research facilities based on online science services (<https://elsa.brin.go.id>)
- **Lack of necessary equipment:** high number of customers and some characterization equipment is not yet available.
- **Troubleshooting and Consumable part:** The problem cannot be resolved immediately and a long purchasing time
- **Problems arising from the use by overseas researchers/customers:** Sample delivery process

Current status and challenges of the environment for the use of advanced research equipment of ASEAN-Japan joint research (or international joint research)

- ✓ CryoEM & TEM for life science and material science → **Advanced training and practice**
- ✓ For research facilities that are not yet available, we conduct research collaborations with foreign researchers or pay a charge
- ✓ BRIN open for:
 - **Research Facilities** (<https://elsa.brin.go.id>)
 - **Post-Doctoral & Visiting Researcher** (<https://manajementalenta.brin.go.id>)

How ASEAN and Japanese researchers are able to cooperate for contributing to solving those challenges?

- Reactivating Indonesia Society for Microscopy (InaSM) for enhancing research collaboration in ASEAN countries and Japan in the field of electron microscopy
- Building online databases related to existing research facilities in ASEAN countries and Japan
- Conducting regular seminars/workshops related to recent technology in material characterization, ie. Electron Microscopy and its industrial applications in the frame of collaboration with a correlated society
- Enhancing the research collaboration with ASEAN and Japanese researchers (Visiting Researcher, Post-doctoral, student exchange, etc.)



BRIN is ready to support more collaborative activities among ASEAN countries and Japan through our researcher mobility program and open platform initiative.



We mostly welcome potential partners from global or local to work together, and to develop mutual – beneficial – long-term relationship.

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Thank You



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