

The 30th Hokkaido Branch Meeting and EES seminar

Toshiyuki Sasaki

(Diffraction and Scattering Division, Japan Synchrotron Radiation Research Institute)

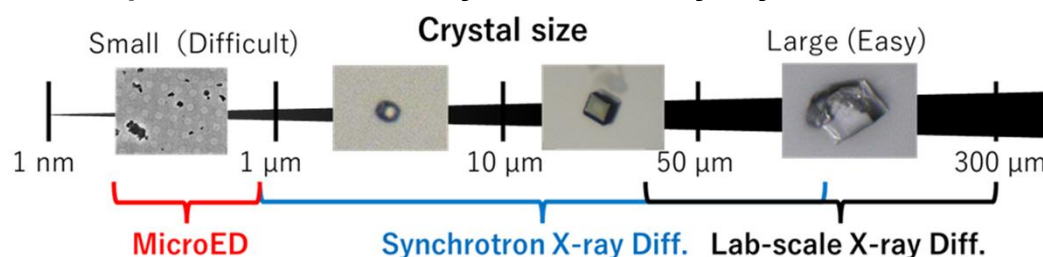
“Unveiling the Unseen World: Advanced Structural Analysis Pioneering New Material Discovery”

Date: 8th December 2025, 16:45~18:00

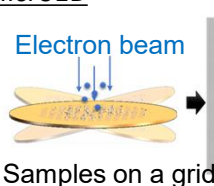
Place: D201, Faculty of Environmental Earth Science, Hokkaido University



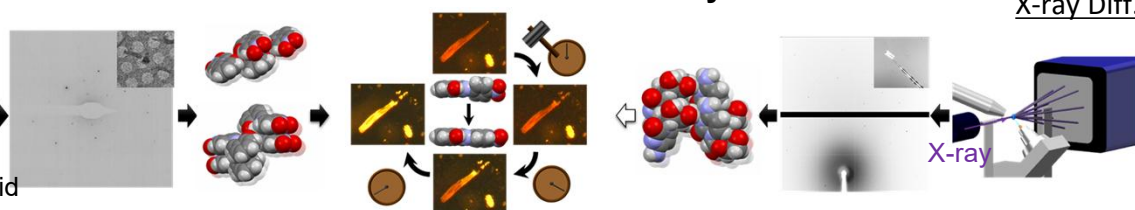
Optimal Structural Analysis Methods by Crystal Size



MicroED



Novel Luminescent Material Elucidated by MicroED



(Both Techniques Driving Rational Material Design)

T. Sasaki et al., *CrystEngComm*. **2023**, 25, 352; *J. Mater. Chem. C*, **2024**, 12, 8508.

Just as diamond and pencil lead are both made of carbon, a material's function is determined by its atomic arrangement (structure). This principle guides functional material development for environmental and energy solutions. This seminar will first explore the structure-function relationship, introducing how SPring-8's synchrotron X-ray enables atomic-level visualization of molecular assemblies. However, even powerful X-rays faced an "X-ray wall" in determining the structure of ultrafine nanocrystals smaller than a few hundred nanometers. This challenge led to MicroED (Microcrystal Electron Diffraction), a cutting-edge technique using a transmission electron microscope. Leveraging electron beams' ~10,000 times stronger interaction with matter compared to X-rays, MicroED is a groundbreaking method that reveals the atomic-level structures of nanocrystals previously invisible to X-rays. In the latter half, I will present our research strategy, integrating new material synthesis and advanced structural analysis (synchrotron X-rays and MicroED). Through concrete case studies, including the elucidation of long-mysterious molecular assembly structures via MicroED, I will explain how this "making" and "seeing" fusion pioneers new frontiers in material creation.

Host: Faculty of Environmental Earth Science, Hokkaido University and Hokkaido Branch, The Japan Petroleum Institute

Co-host: Hokkaido Branch, The Chemical Society of Japan



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