

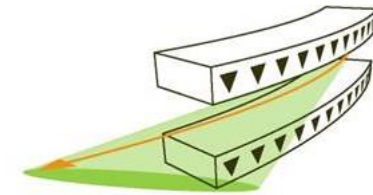


Elettra Sincrotrone Trieste

MCX@Elettra

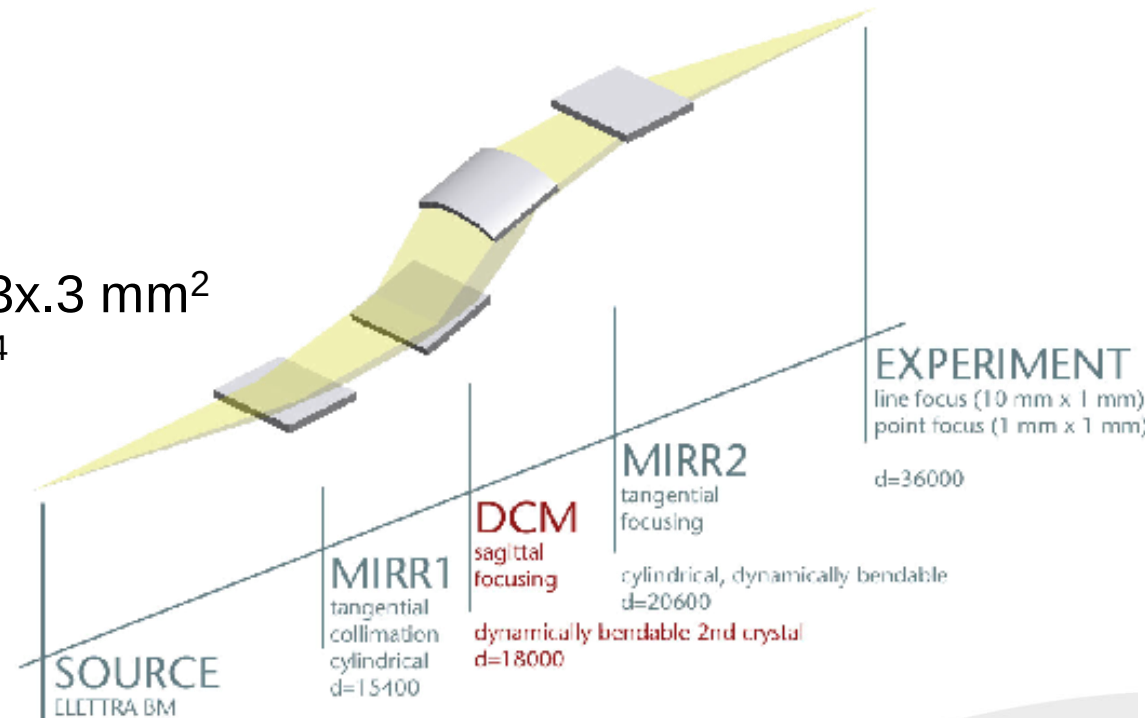
Light Source:

- Bending magnet
- Critical energy : 3.2keV (2.0) , 5.5keV (2.4)



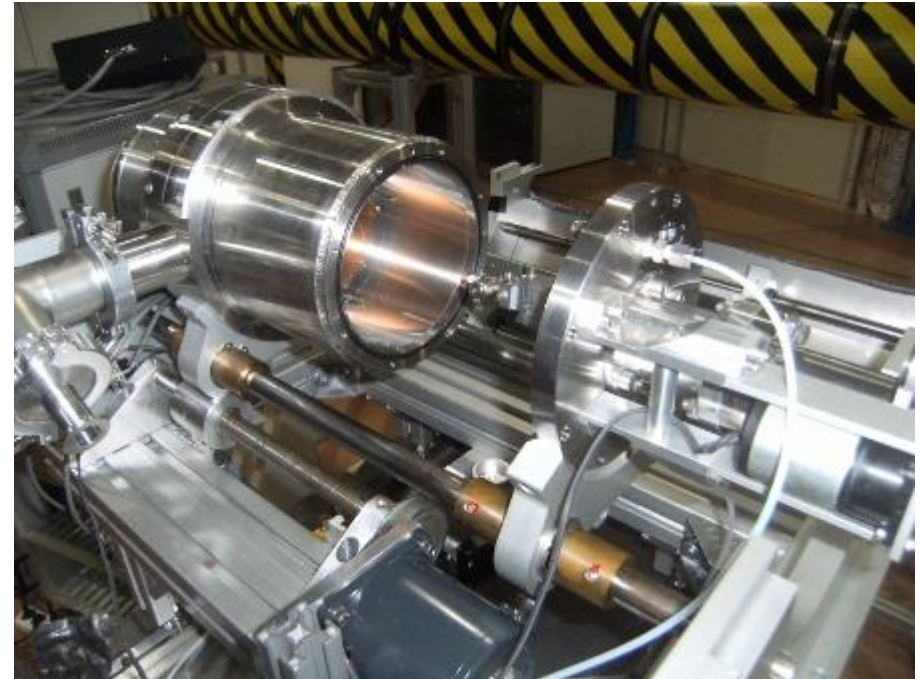
X-rays at sample:

- Energy range : 6-20 keV
- Photon flux : 10^{11} photons/sec
- Beam size at sample : 10x1 - .3x.3 mm²
- Energy resolution : $\Delta E/E$ 2×10^{-4}





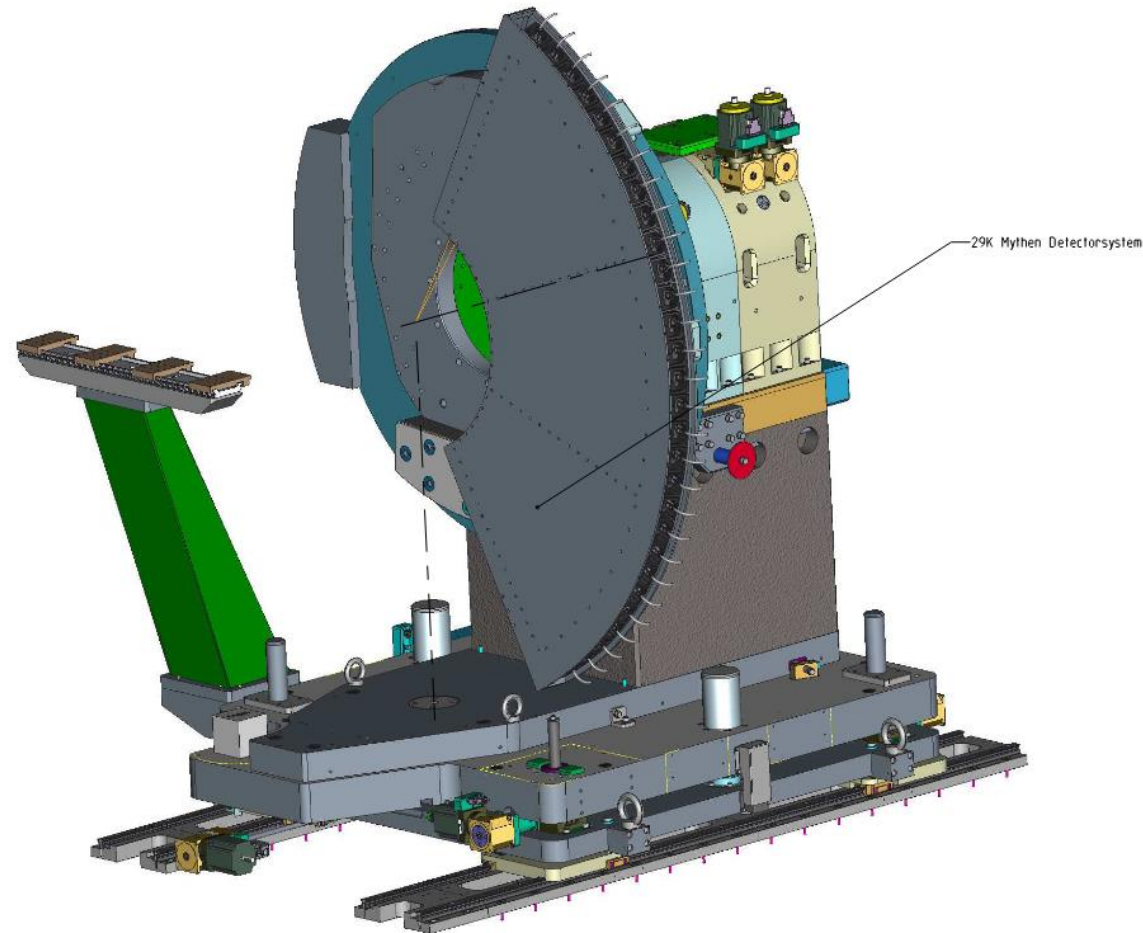
- 4-circle diffractometer
- Transmission, reflection, grazing
- Temperature control 100-1273 K
- Scintillator detector / CCD



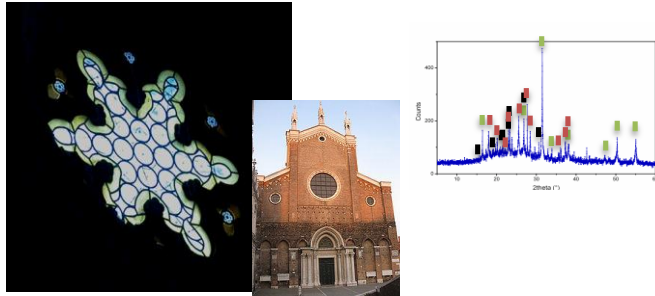
- Furnace (RT-1273K)
- Transmission
- Controlled atmosphere / gas flow
- Image plate (offline)

MCX: major upgrades

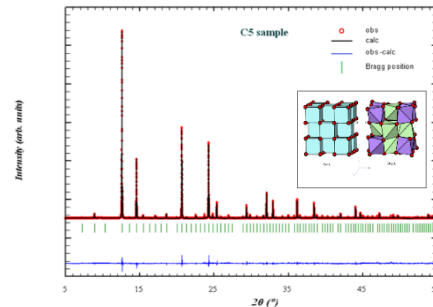
- ✓ Early 2022 a new diffractometer equipped with a mythen detector covering 120° was ordered
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- ✓ Estimated installation June 2023.



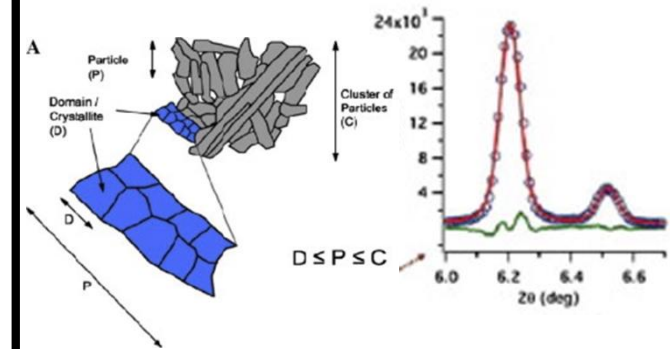
Phase Identification



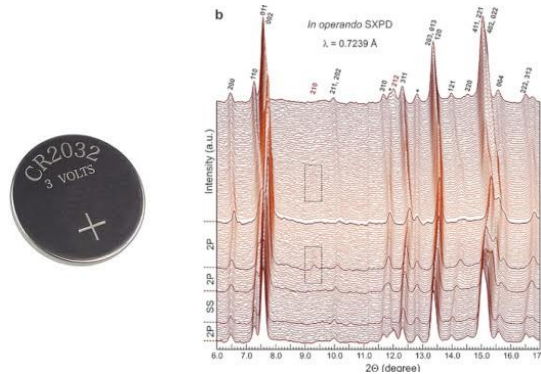
Structure Determination



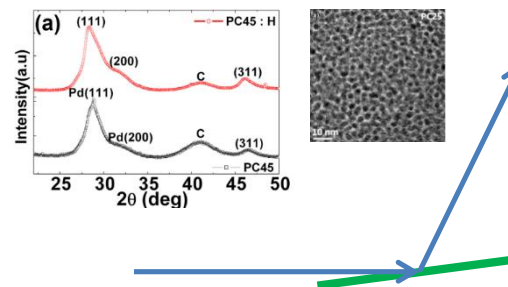
Line Profile Analysis



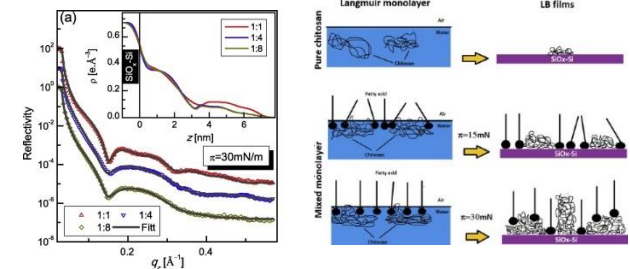
Operando



Grazing Incidence Diffraction



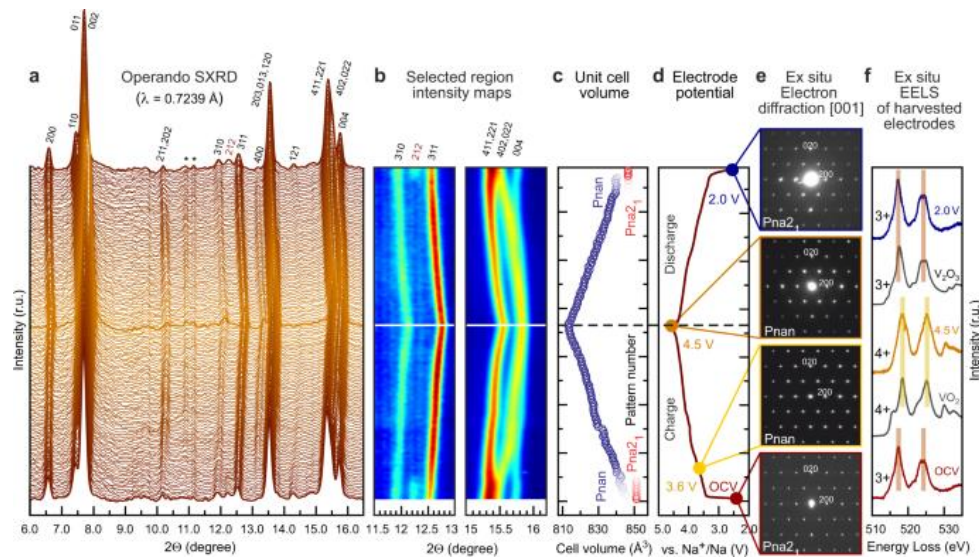
X-ray Reflectivity



- Main application fields: Energy Storage, Chemistry, Thin Films, Cultural Heritage, Pharma, Nanomaterials, Geology, Catalysis .

MCX: research highlights : Batteries

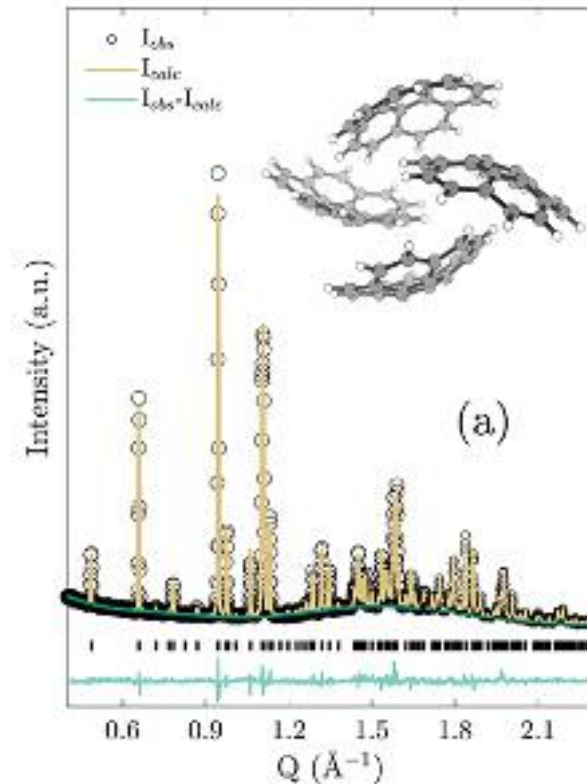
- ✓ **Development of vanadium-based polyanion positive electrode active materials for high-voltage sodium-based batteries** - S.D. Shraer *et al.*, Nature Communications **13**, 4097 (2022)



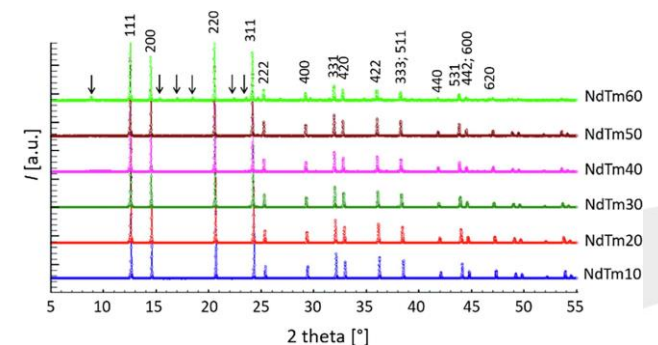
- ✓ **Pushing Stoichiometries of Lithium-Rich Layered Oxides Beyond Their Limits** - C. Arcangelo *et al.*, ACS Applied Energy Materials **5**, 1905 (2022)

MCX: research highlights : Structures

- ✓ **Emergence of Dynamical Disorder and Phase Metastability in Carbon Nanobowls** - M. Gaboardi *et al.*, *Carbon* **183**, 196 (2021)



- ✓ **The role of defects association in structural and transport properties of the $\text{Ce}_{1-x}(\text{Nd}_{0.74}\text{Tm}_{0.26})_x\text{O}_{2-x/2}$ system** – C. Artini *et al.*, *Journal of Energy Chemistry* **60**, 494 (2021)



Thank you!



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