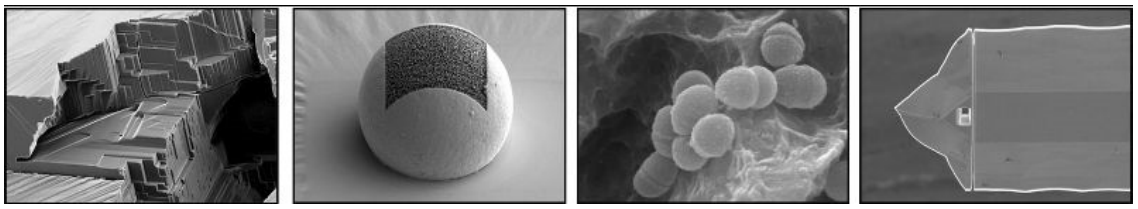
University of Basel
Swiss Nanoscience Institute

Swiss Nanoscience Institute
Exzellenzzentrum
der Universität Basel und
des Kantons Aargau

NANO IMAGING LAB

Newsletter

July 2nd, 2024



Annual works outing of the NI Lab to the EPFL Lausanne

On June 25, 2024 we took a trip to Lausanne to pay a friendly visit to the Dubochet Center and the EPFL EM facility of Marco Cantoni. During the first part of the agenda Alexander Myasnikov, head of the DCI Lausanne, showed us around in the Dubochet Center for Imaging (DCI), which was inaugurated in September 2023. He elaborately explained about the genesis and problems, which they had to overcome in order to build a solid working area for their extremely sensitive high-end cryo electron microscopes with resolutions of around 1 Angström. The equipment and the work flow of the DCI, that studies biological molecules, viruses, bacteria, micro-crystals, small organelles, or sections of biological cells or tissue, was extremely impressive to all of us.

The second part lead us to Dr. Marco Cantoni, the director of the Interdisciplinary Center for Electron Microscopy (CIME).This electron microscopy facility is dedicated to studies in solid-state physics, material sciences and life sciences and serves as a research and service center. With its operation of 14 different electron microscopes and a very broad spectrum of preparation techniques, this platform hardly leaves any wishes open. Leaving Marcos Labs highly impressed and inspired, we enjoyed the rest of the afternoon at the beautiful borders of Lake Geneva with a walk back to Lausanne.

We are gearing up: The installation of a Zeiss FIB-SEM Crossbeam 540 is in full progress

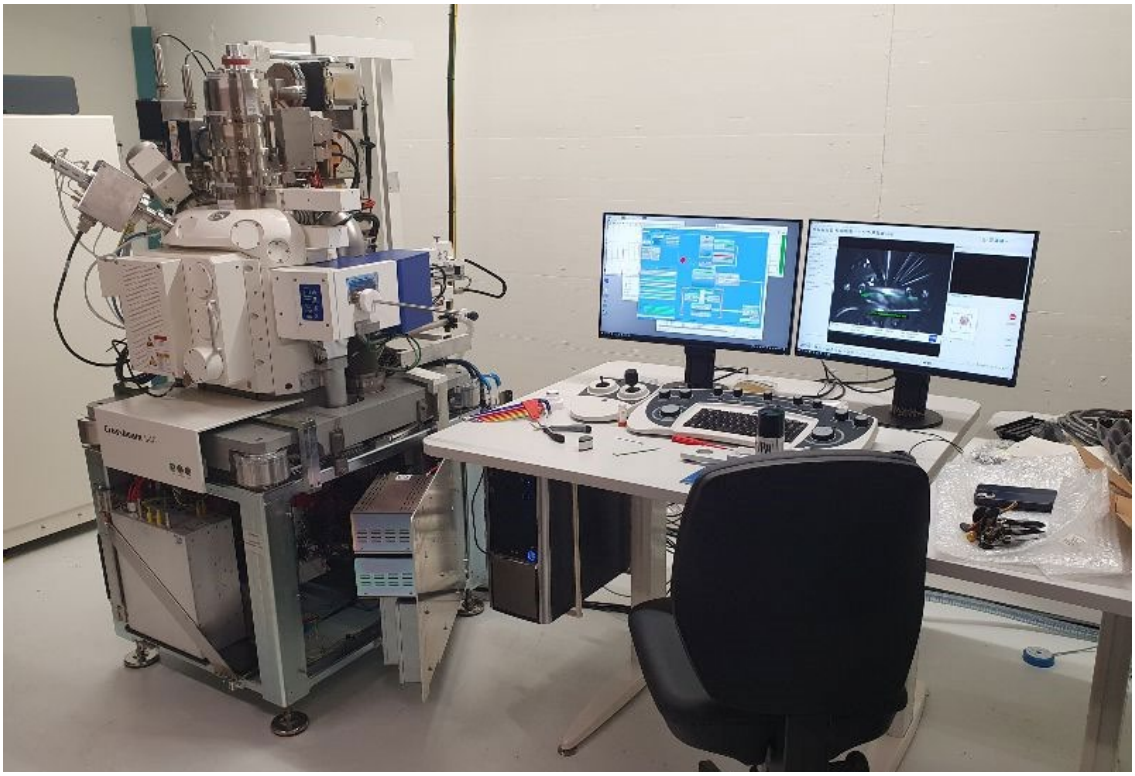
The microscope is expected to be available for users in mid-August. The new microscope is mainly used for sample preparation for the JEM-F200. The other two FIBs (FEI Helios NanoLab 650, FEI Versa 3D DualBeam) will then be used primarily for additive and subtractive nanolithography processes. The focus here is on the investigation of gold depositions that are as pure as possible and the writing of cobalt structures [1], both using the FEBID/FIBID technique. The NI Lab team is delighted to have taken another important step in the direction of materials science.

Fields of application at a glance

- Local cross sections, e.g. at defect sites (growth defects of thin films, corrosion, trapped particles, etc.)
- TEM lamella preparation
- High-resolution cross-section investigations in transmission (STEM)
- 3D tomography of microstructure or local defects
- Processing of structures via targeted material removal

The **Crossbeam 540 Basic Unit** is equipped with patented GEMINI II electron optics for fast high-resolution analytic. This FE-SEM is optimized for use with a Ga-focused Ion beam (Ga-FIB). Further technical details are: Large chamber with 18 accessory ports, auto pendulum anti vibration system, 6-axes motorized super-eucentric stage. Two gas injection systems (GIS) for the deposition of Pt and C are available. An in-situ micromanipulator from Kleindiek is installed for lift-outs.

The **FIB-Capella+** is equipped with a Ga-Liquid metal ion source (Ga-LMIS) with long source life time of 3000 µAh and high current stability. Resolution at 30 kV: 3nm. Voltage Range: 500V - 30 kV. Probe current range: 1 pA - 100 nA. Motorized high precision aperture changer, electrostatic beam blanker.



Detectors:

INLENS-DOUBLET-XB: Energy selective backscatter in-lens detector
aSTEM4: pneumatically retractable STEM detector for BF, DF, ADF, HAADF with the possibility of parallel detection of four segments
BSD1: retractable diode detector with 4 quadrants
SESI-FF XB 40: SESI Detector for imaging of secondary electrons such as secondary ions

[1] Liza Žaper, Peter Rickhaus, Marcus Wyss, Boris Gross, Martino Poggio, Floris Braakman, **Scanning NV magnetometry of focused-electron-beam-deposited cobalt nanomagnets**, ACS Appl. Nano Mater. 7, 4, 3854–3860 (2024)
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