Universität Siegen

@ELSA INSIGHT

Investigation of the strong interaction in the light flavor sector

CmF infrastructure: InCyTe
Interdisciplinary Research Center for Nanoanalytics, Nanochemistry and Cyber-physical Sensor Technologies

Markus Cristinziani

TA1 kick-off meeting
November 14th, 2025

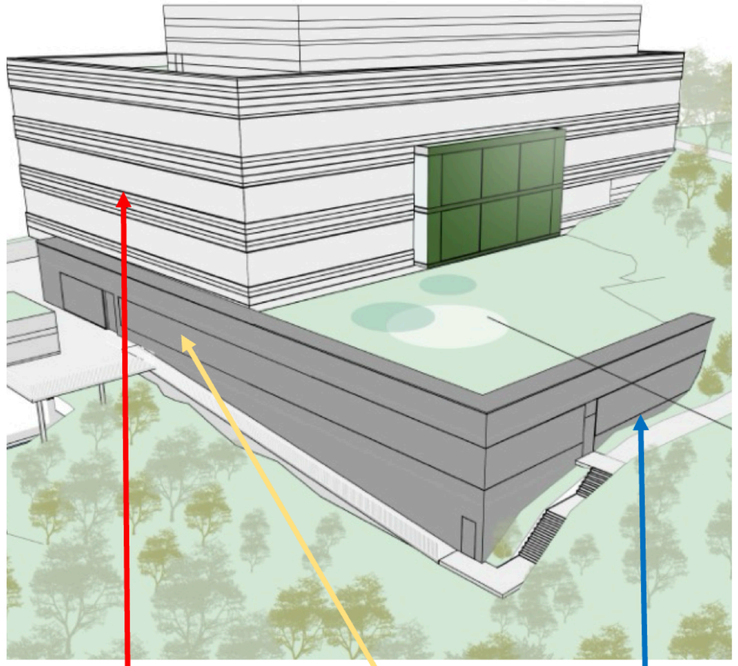
color meets flavor

Core facility of the School of Science & Technology


Steiner
MAN
12/1644


Universität
Siegen
since Aug 2025 solving issues with BLB before official handover

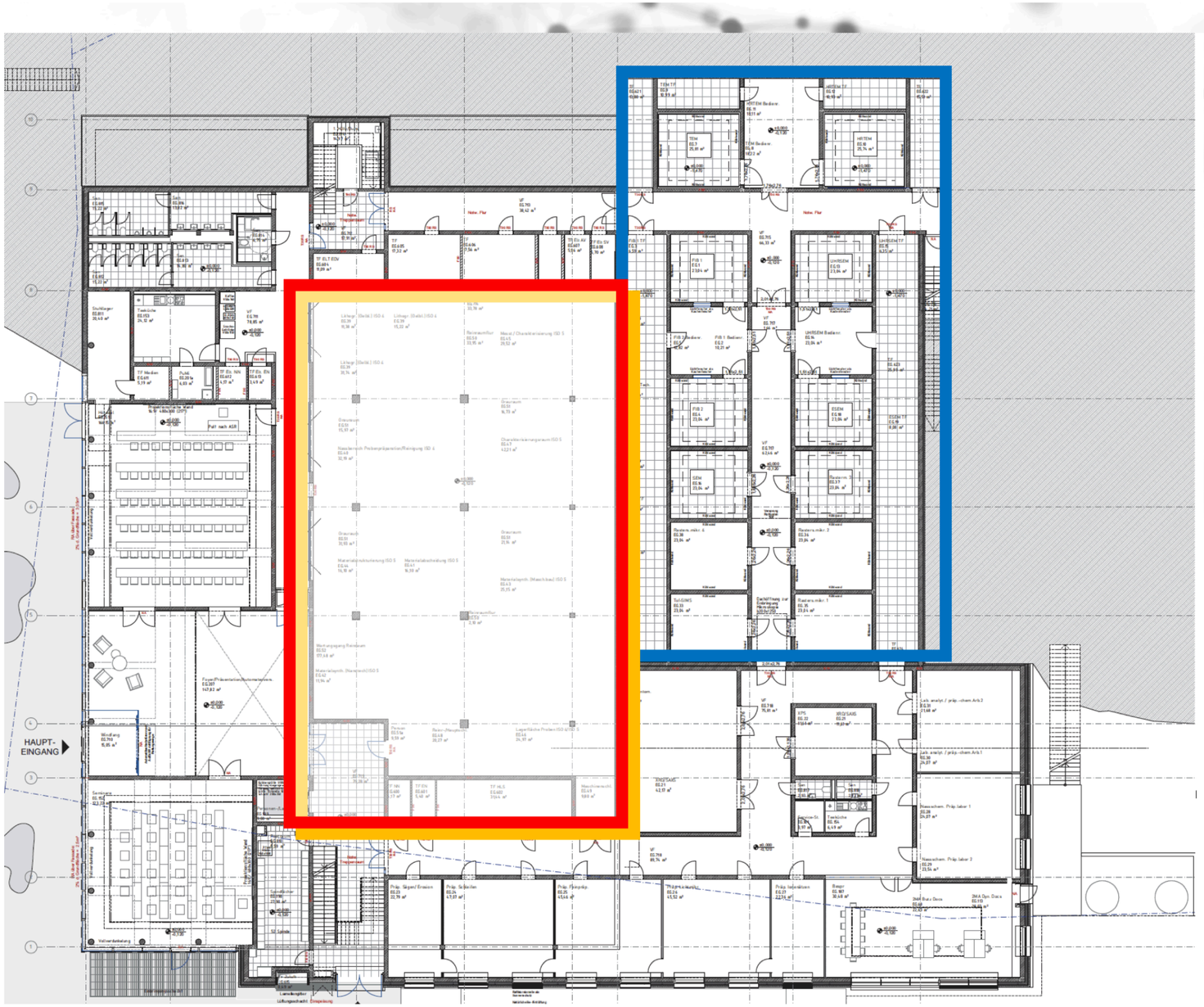
R&D infrastructure and synergy center



Biochem. Labs

Clean room

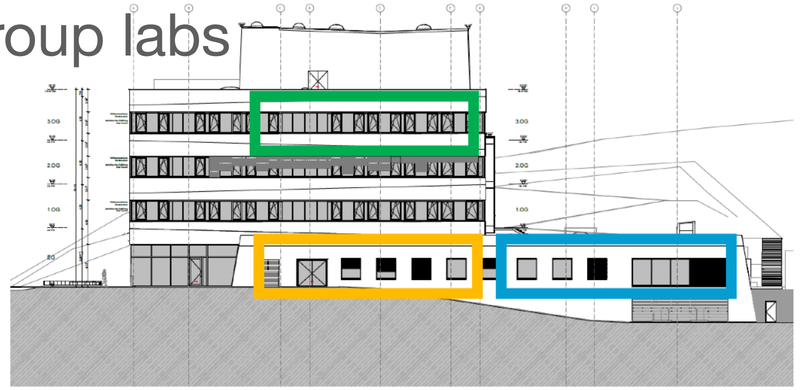
Nanoanalytics

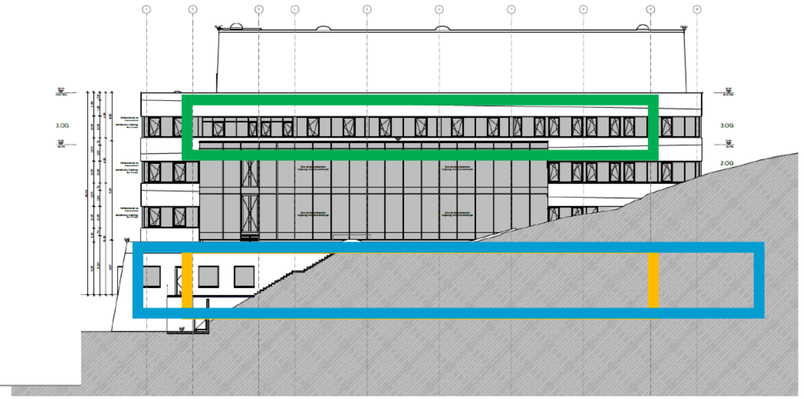


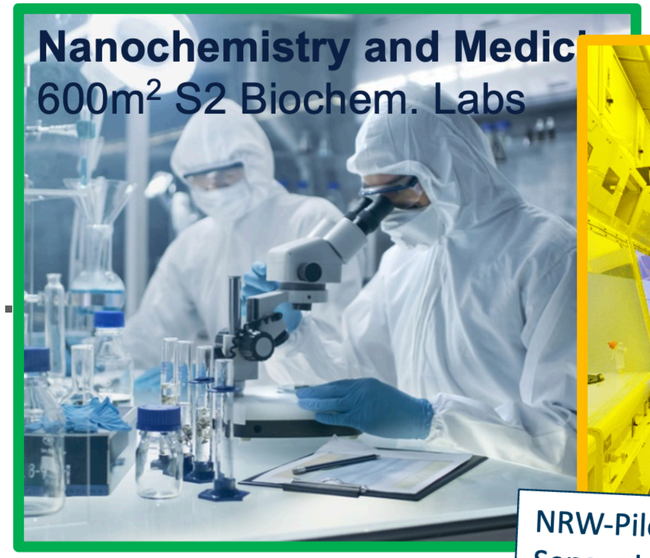
R&D infrastructure and synergy center

5.500 m²

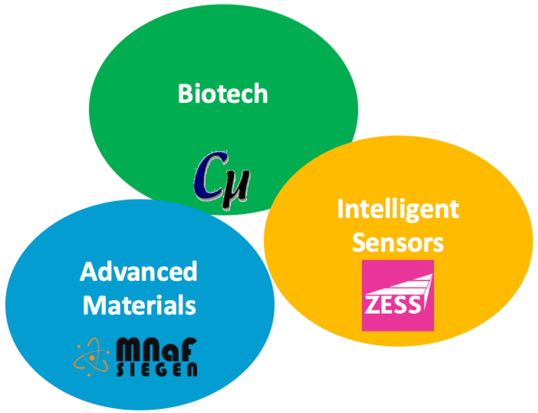
- 600 m² ISO4, 600 m² S2/S1 labs
- 7 EM-labs
- 300 m² analytics, 300 m² sample prep.
- group labs







NRW-Pilot line Heterogeneus Sensor Integration granted



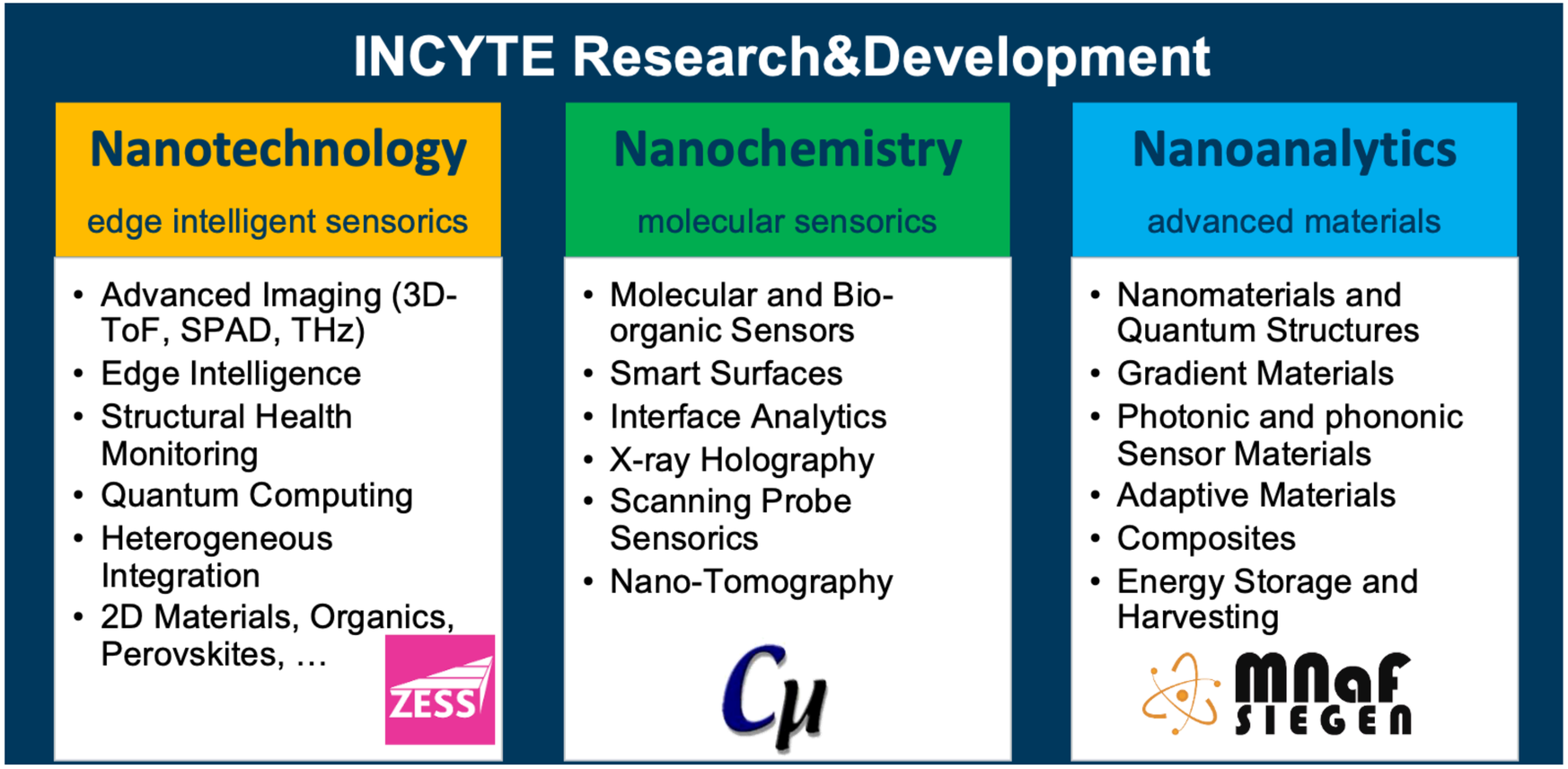
granted

MNaf SIEGEN

Research at INCYTE

More than 25 groups from departments of School of Science and Technology

- Electrical engineering
- Mechanical engineering
- Chemistry
- Physics
- Computer science



Nanoanalytics facility

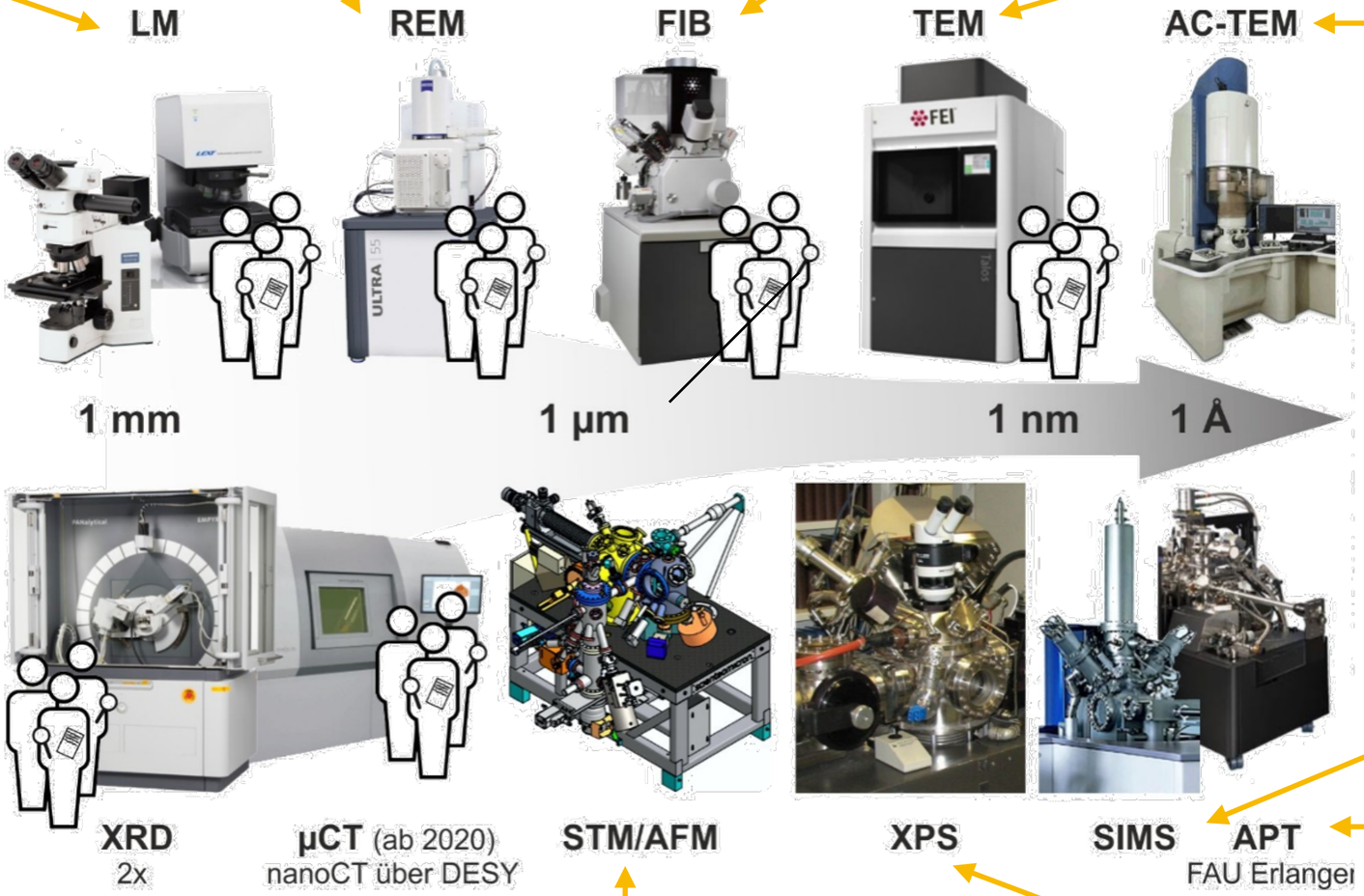
Light Microscopy

Raster Elektron Mikroskopie (SEM)

Focused Ion Beam

Transmission Electron Microscopy

Aberration-Corrected TEM



X-ray Diffraction

Secondary Ion Mass Spectrometry

Atom Probe Tomography

Microcomputed Tomography

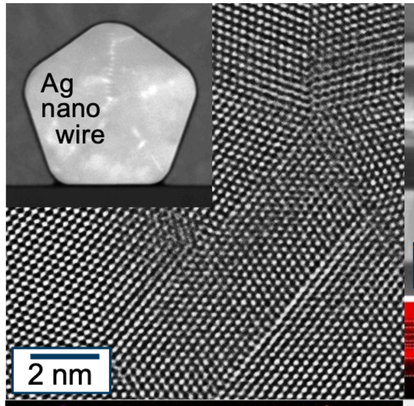
Scanning Tunneling / Atomic Force Microscopy

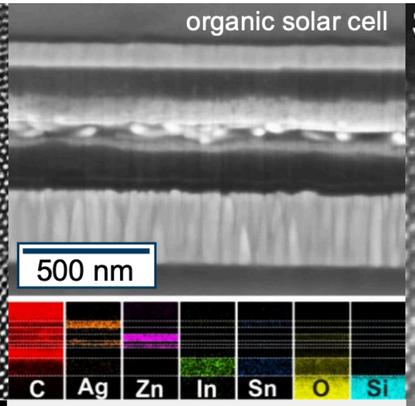
X-ray Photoelectron Spectroscopy

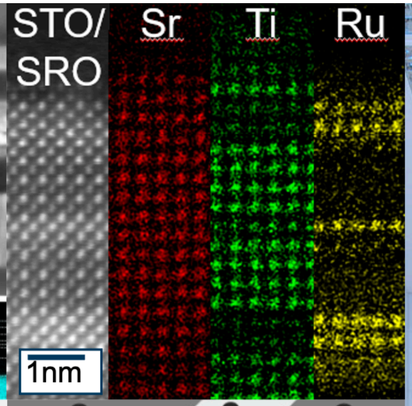
Nanoanalytics

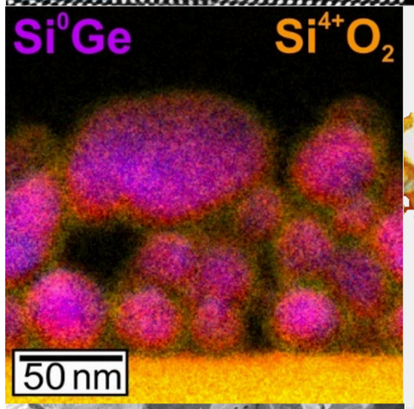
Methods portfolio

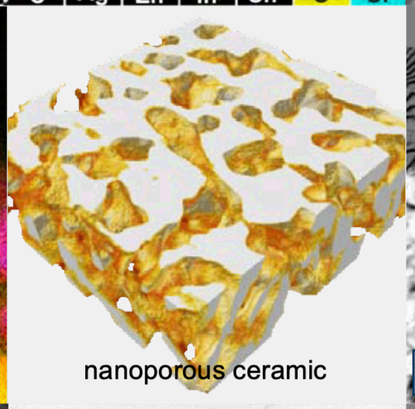
Materials/
device research
+
Methods
developments

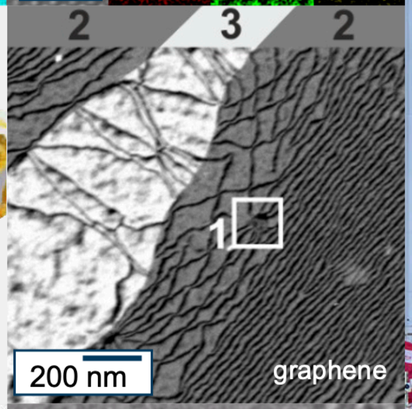


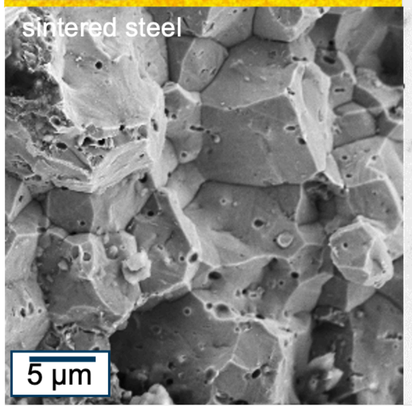


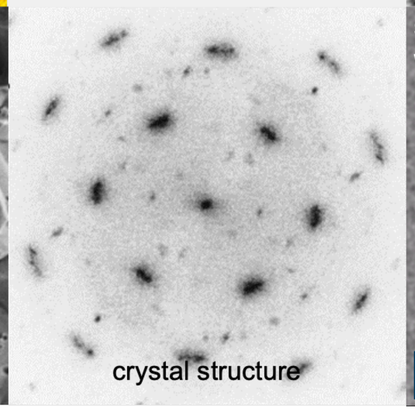


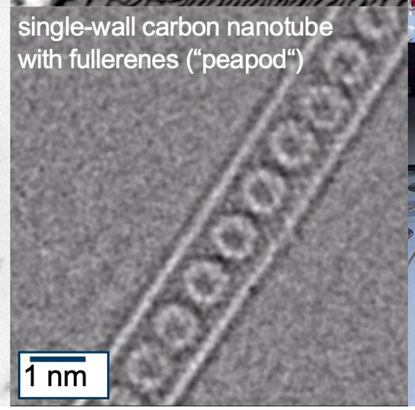


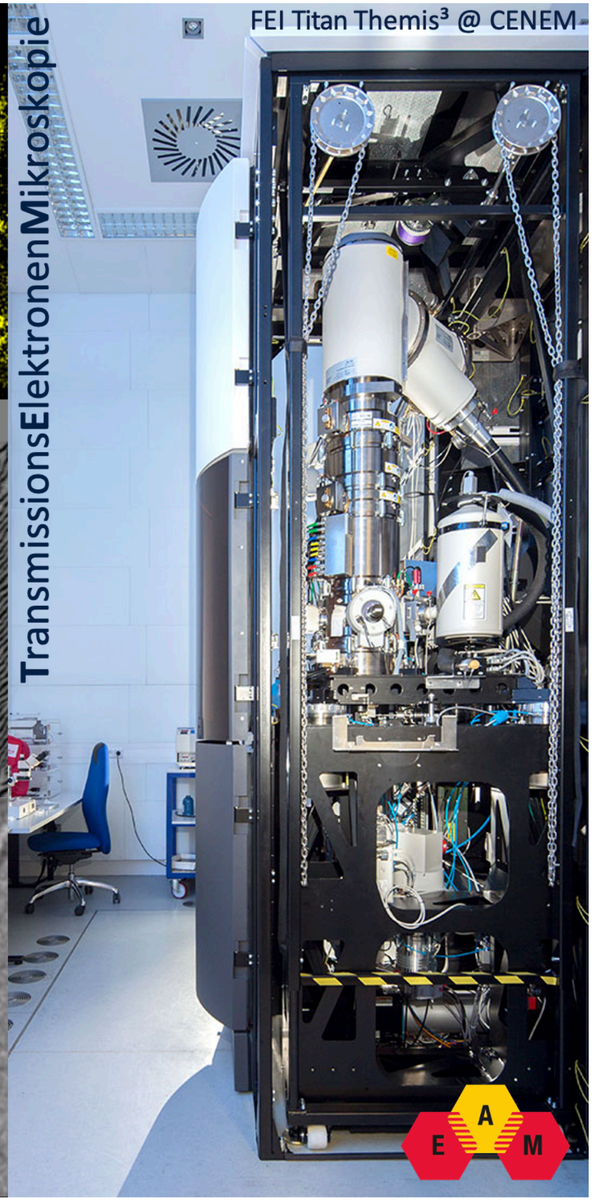






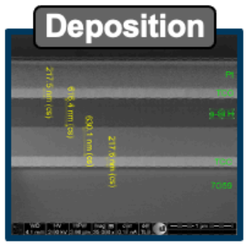


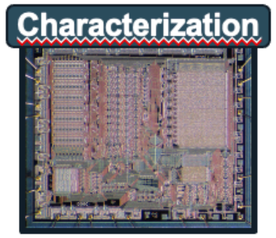


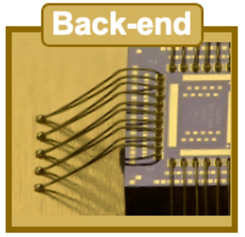


Adv Energy Mater ’20 JACS ’14 Energy Env Sci ’18 Nanoscale ’15 Nat Phys ’15 ACS Photonics ’19 Nature ’14 Adv Energy Mater ’13 Acta Mater ’15

Cleanroom Nanofacility







Process chain

Wet bench

3x PVD

eBeam Litho

Prober station

3D Nanoprint

Laser litho

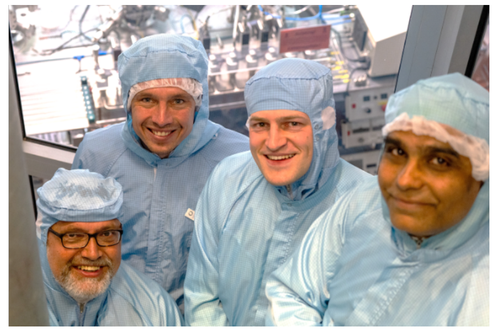
RIE

ALD

DFG Deutsche Forschungsgemeinschaft
„Gerätezentren – Core Facilities“
NRW-Pilot line Heterogeneus Sensor Integration

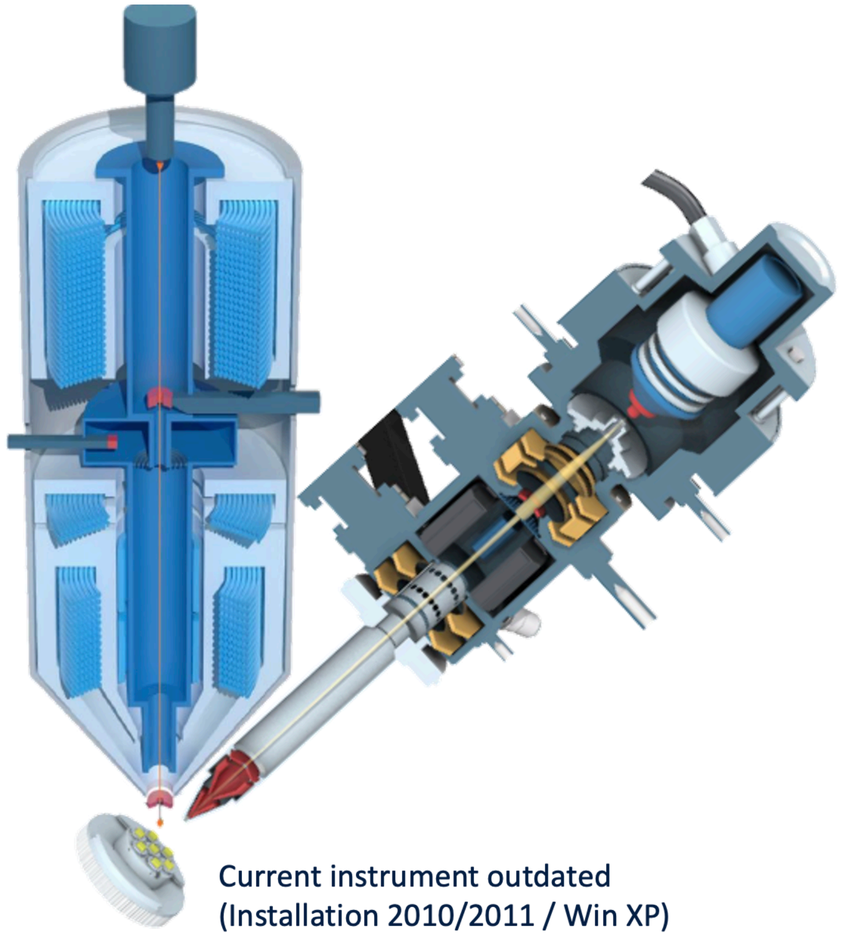
Nanotechnology facility

- 600 m² ISO4 cleanroom
- 300 m² Optoelectronics
- 150 m² HF-Sensorics

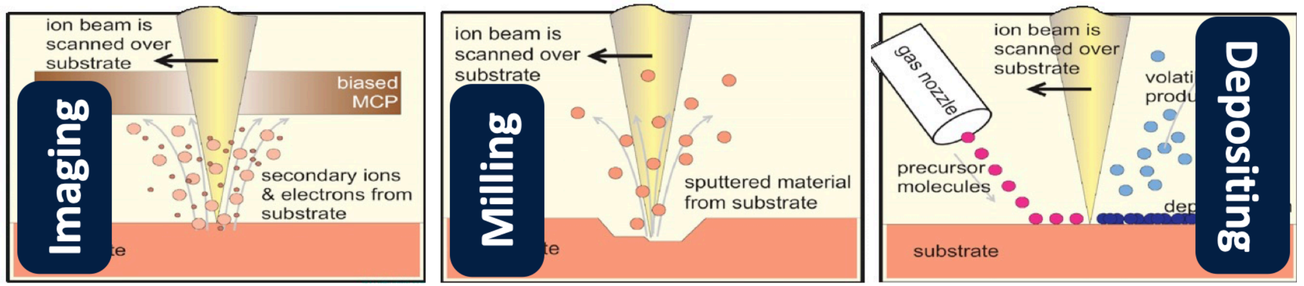


Focused Ion-Beam instruments

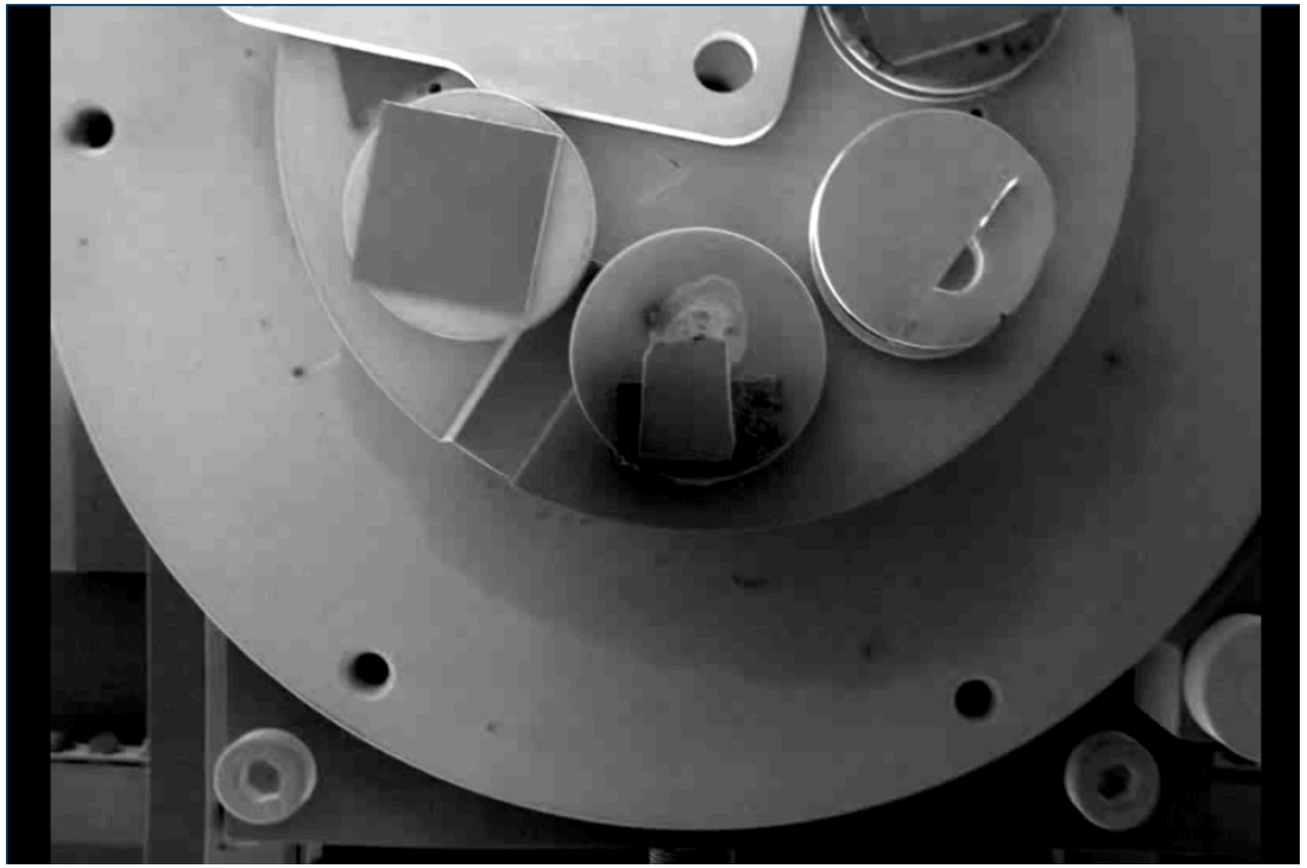
New FIB currently being installed



Current instrument outdated
(Installation 2010/2011 / Win XP)



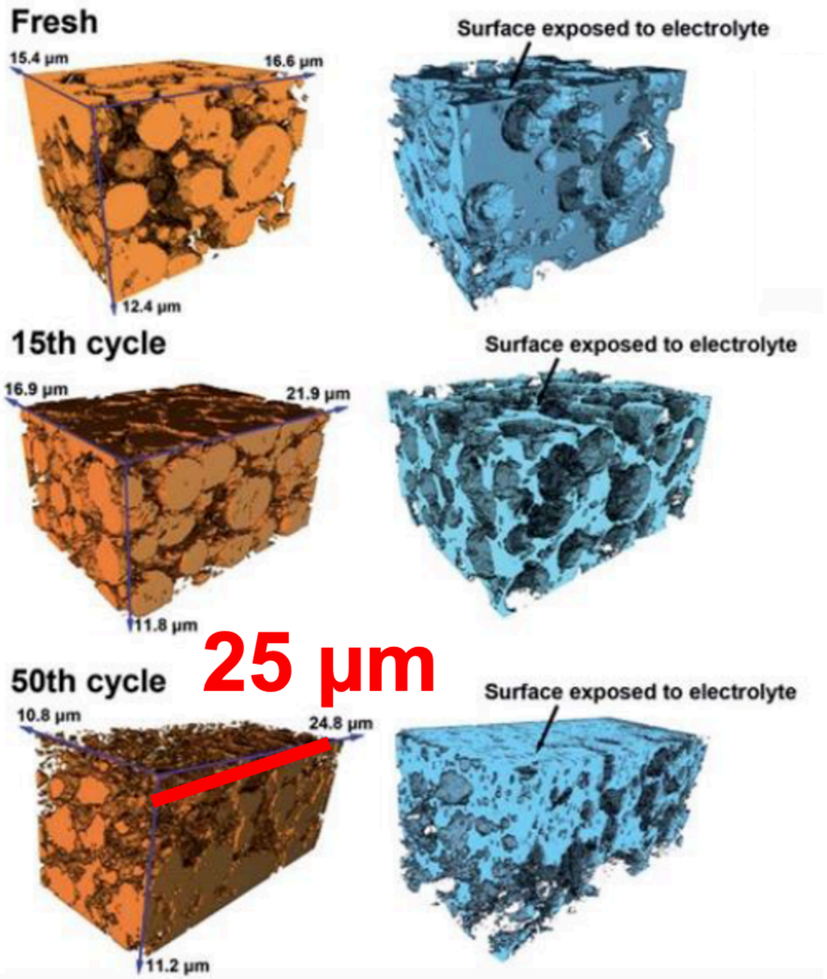
from Tescan



Large-Scale Cross-Sectioning and 3D Characterization

Some examples

Ga-FIB

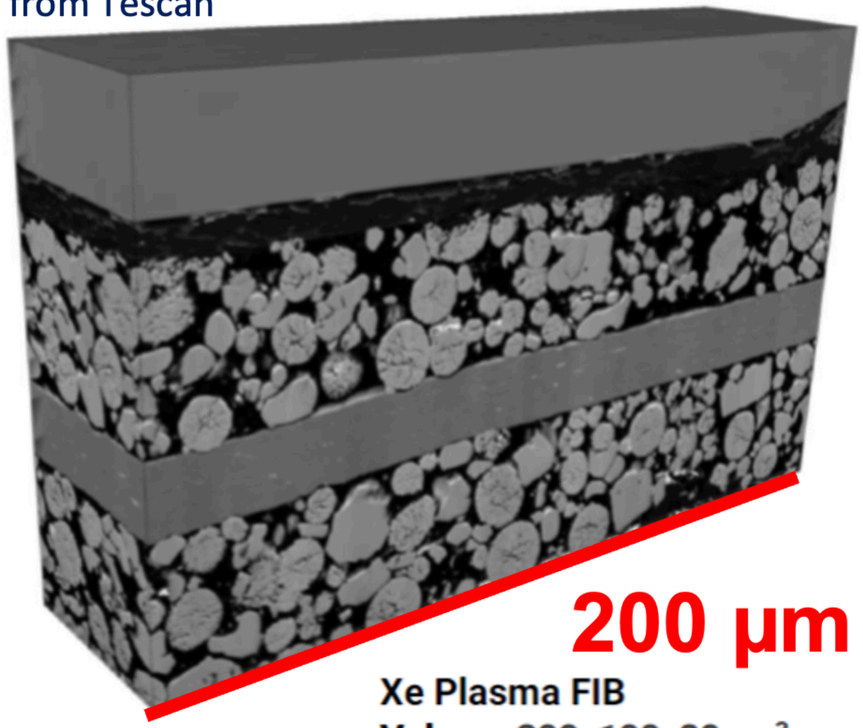


Ga FIB: Volume 10x10x20 um ^{3}

[1] B. Song, T. Sui *et al.*, *J. Mater. Chem. A*, 35, 18171 (2015)

Xe-plasma FIB

from Tescan



Xe Plasma FIB
Volume 200x100x80um^3
Voxel: 100 nm

INCYTE

Central Infrastructure located at Universität Siegen

Focus on nanoanalytics, -chemistry and -technology

Shared use of core facilities

- e.g. Nanotechnology facility and TEMs or FIBs for analytics

Excellence cluster activities very welcome

Backup

Materials and Surface Characterization Techniques

Light Microscopy (LM)

- Uses visible light and optical lenses to image sample surfaces at the micron scale.

Raster Electron Microscopy (REM / SEM)

- Scans the surface with a focused electron beam to produce detailed topographic and compositional images.

Focused Ion Beam (FIB)

- Employs a beam of ions (often Ga^{+}) to mill, cut, or deposit material with nanometer precision; often combined with SEM.

Transmission Electron Microscopy (TEM)

- Transmits electrons through an ultrathin sample to reveal internal structure at atomic resolution.

Aberration-Corrected Transmission Electron Microscopy (AC-TEM)

- Advanced TEM with lens aberration correction for sub-angstrom imaging resolution.

Materials and Surface Characterization Techniques

X-ray Diffraction (XRD)

- Identifies crystal structure, phase composition, and lattice parameters from X-ray scattering patterns.

Micro-Computed Tomography (μCT)

- Creates 3D images of internal structures using X-rays with micrometer-scale resolution.

Scanning Tunneling / Atomic Force Microscopy (STM / AFM)

- STM maps surfaces atom by atom via tunneling current; AFM measures surface topography via tip–sample forces.

X-ray Photoelectron Spectroscopy (XPS)

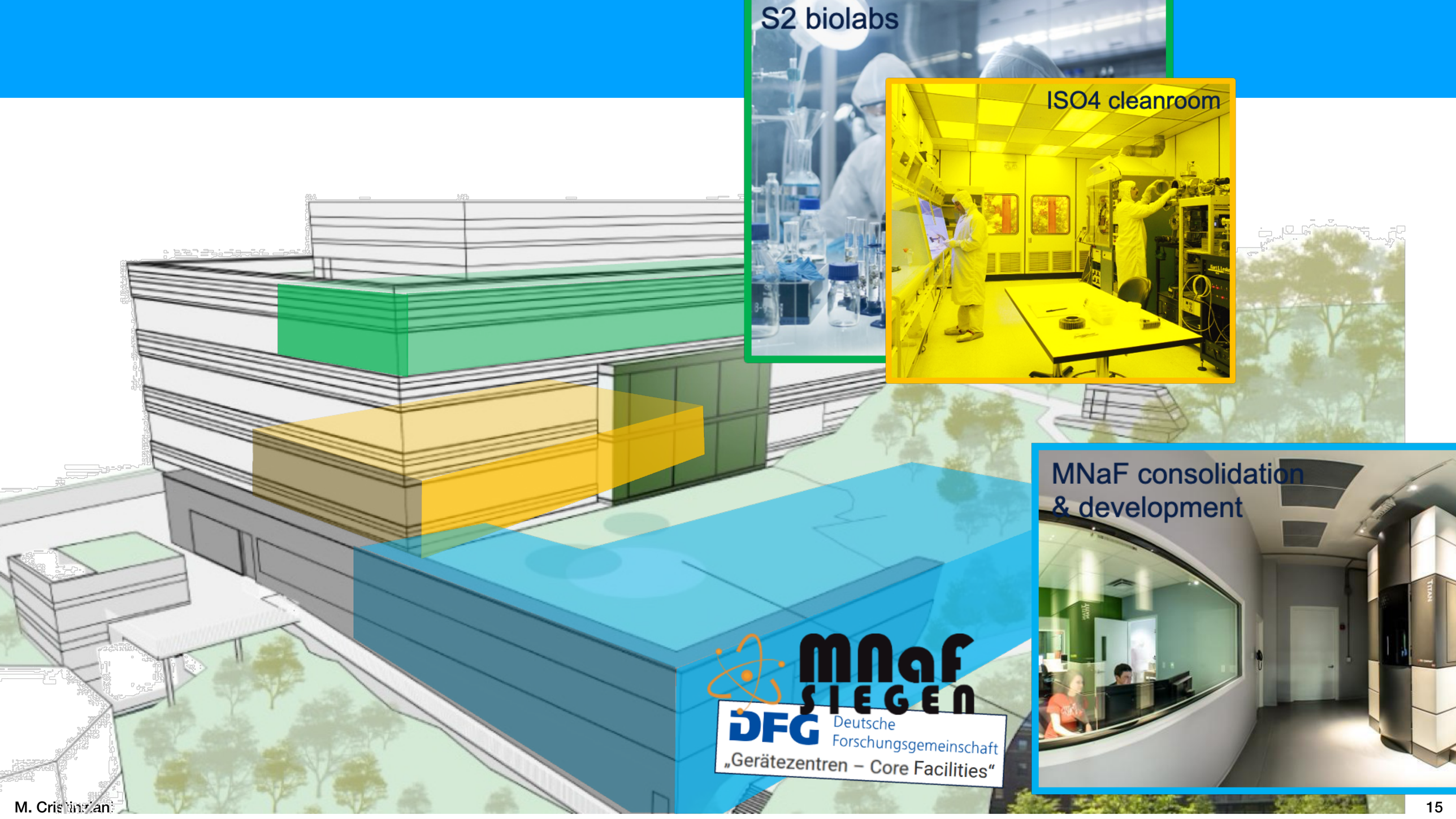
- Determines elemental composition and chemical states within the top few nanometers of a surface.

Secondary Ion Mass Spectrometry (SIMS)

- Analyzes surface composition and depth profiles by sputtering atoms and measuring the ejected secondary ions.

Atom Probe Tomography (APT)

- Provides 3D atomic-scale mapping of composition and structure via field evaporation and time-of-flight mass spectrometry.


S2 biolabs
ISO4 cleanroom
MNaF consolidation
& development
MNaF
SIEGEN
DFG Deutsche Forschungsgemeinschaft
„Gerätezentren – Core Facilities“