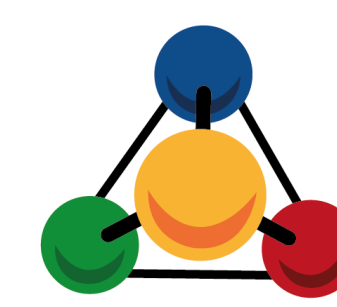




## Department Life, Light & Matter



### ELMI-MV

#### Center for Interdisciplinary Electron Microscopy MV

##### In-Situ HR-TEM



###### Jeol JEM-ARM200F NeoARM

- Atomic resolution analytical electron microscope
- Cold field emission with Cs-corrector
- Acceleration voltages: 40, 80, 120, 200 kV
- 78 pm STEM resolution @ 200 kV
- ABF-, HAADF-, SE-detectors
- Windowless EDX (> 1 sr)
- Imaging EELS filter with resolution < 0.3 eV
- 4k x 4k camera with 300 fps
- In-situ equipment with gas and liquid cell

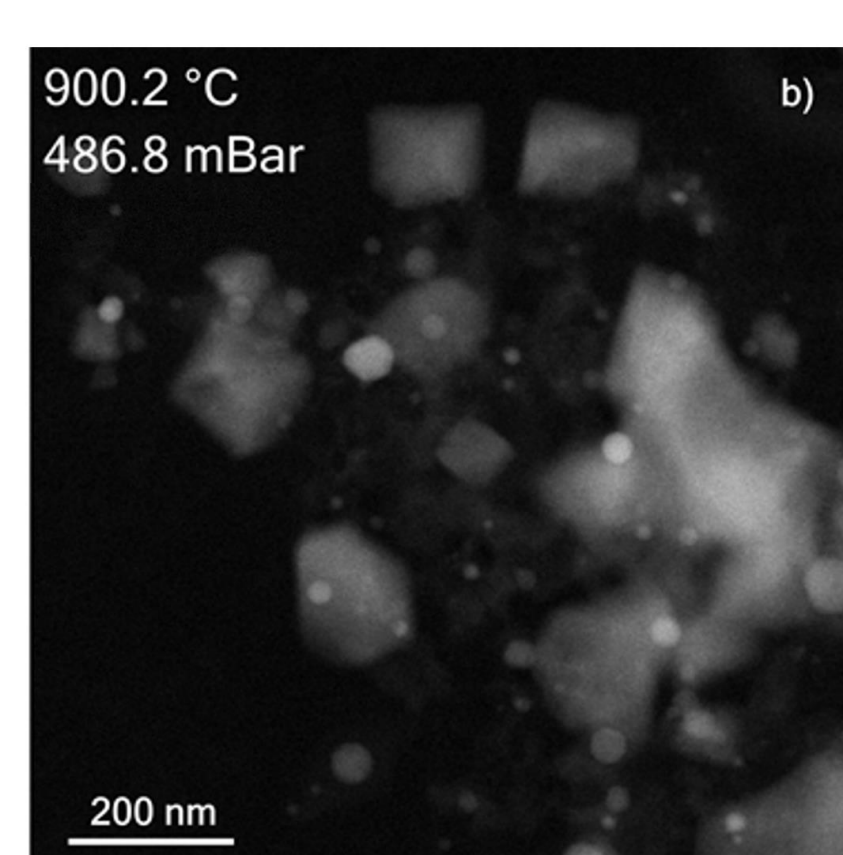
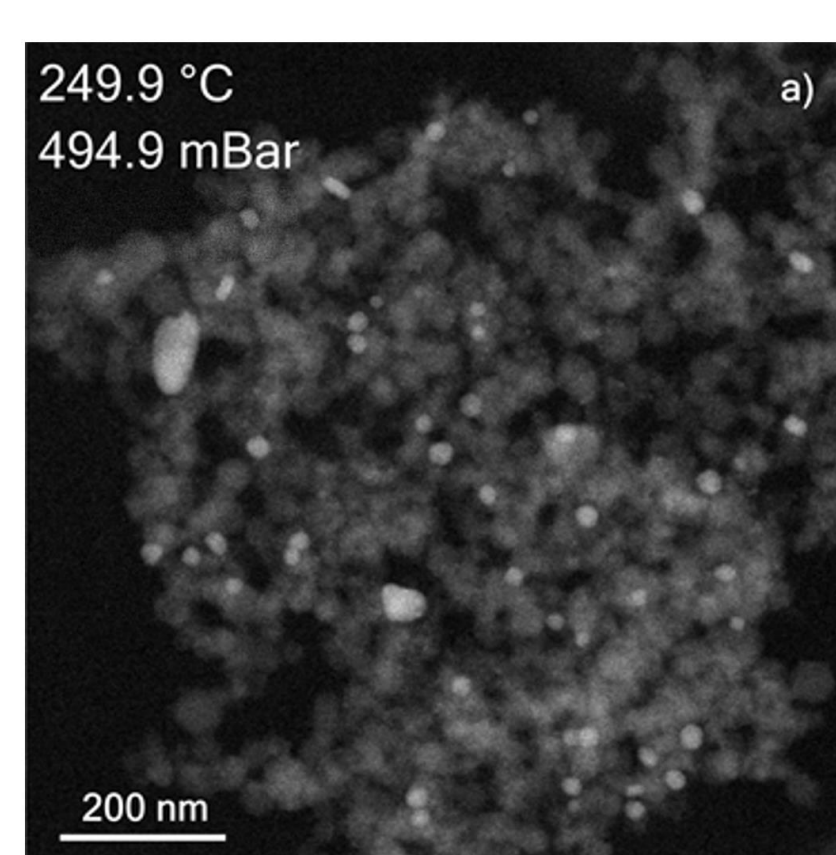
##### Fast Characterization TEM

###### ThermoFisher Talos L120C

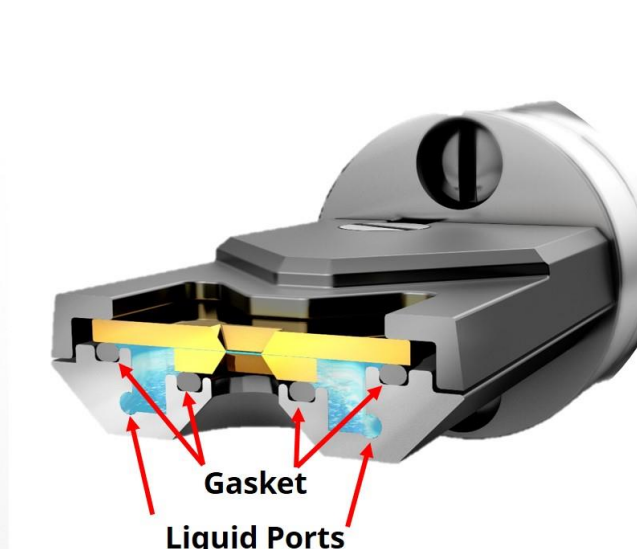
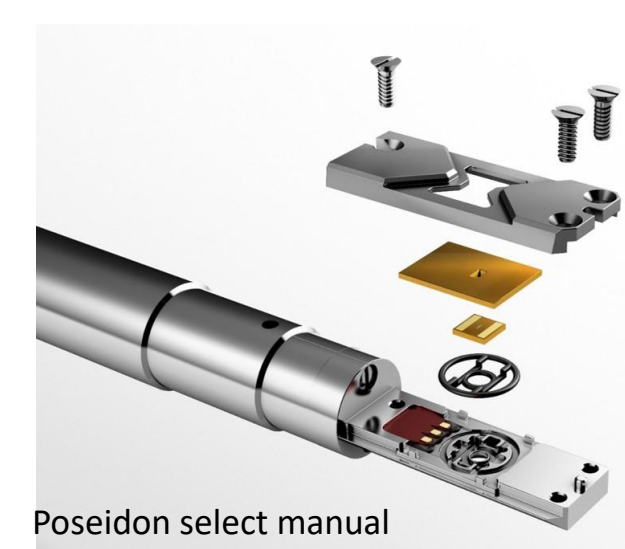
- Analytical electron microscope
- LaB<sub>6</sub> cathode
- Variable High Voltage: 120 kV prealigned
- Resolution TEM: 370 pm @ 120 kV
- Resolution STEM: < 1 nm @ 120 kV
- BF/DF-detectors
- EDS (0.18 sr)
- TFS Ceta High resolution camera (4k x 4k)
- Multi sample holder



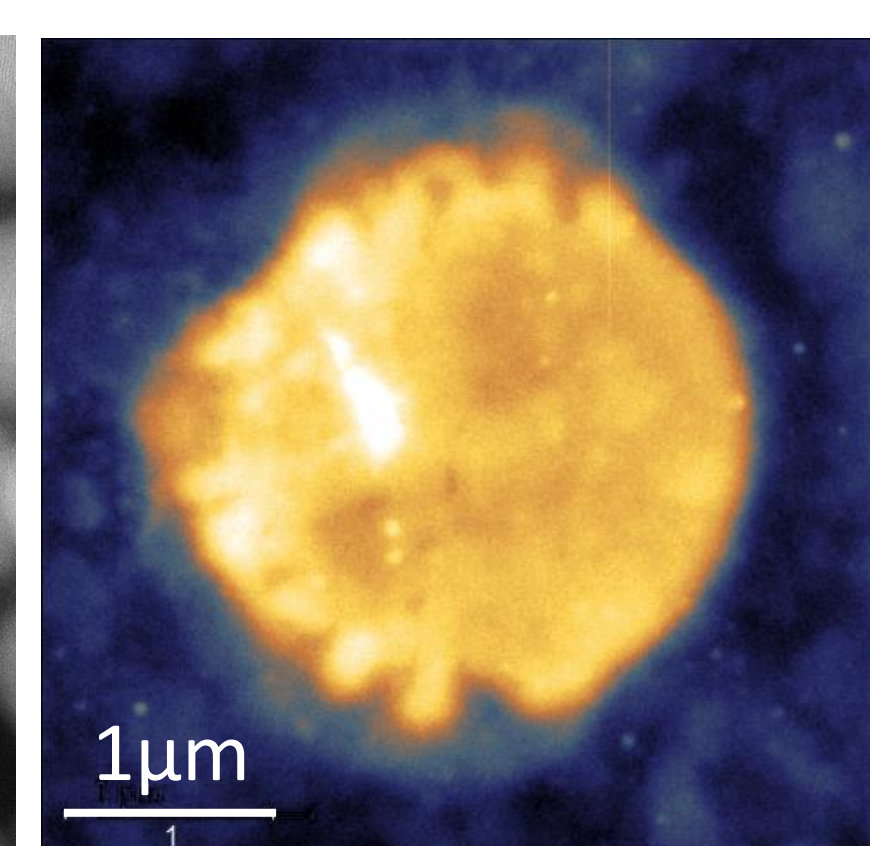
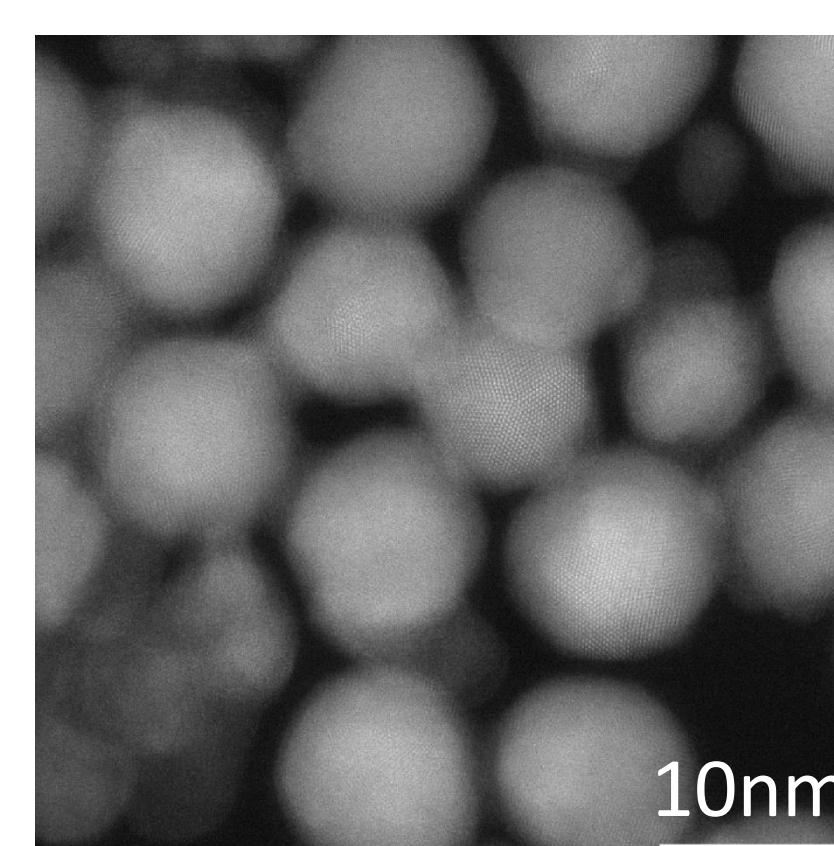
- In-situ gas cell holder: Protochips Atmosphere
- Thin SiN membranes on two silicon E-chips
- **Static** or **flow**
- **Gas mixing**
- **Heating** up to 1000°C, pressures up to 1 atm



Reduction of FeO<sub>x</sub> in H<sub>2</sub> environment



- In-situ liquid cell holder: **Protochips Poseidon Select**
- Thin SiN membranes on two silicon E-chips
- **Spacer** between chip pairs **up to 5 µm**
- **Static** or **flow**
- **Heating and electrochemistry**



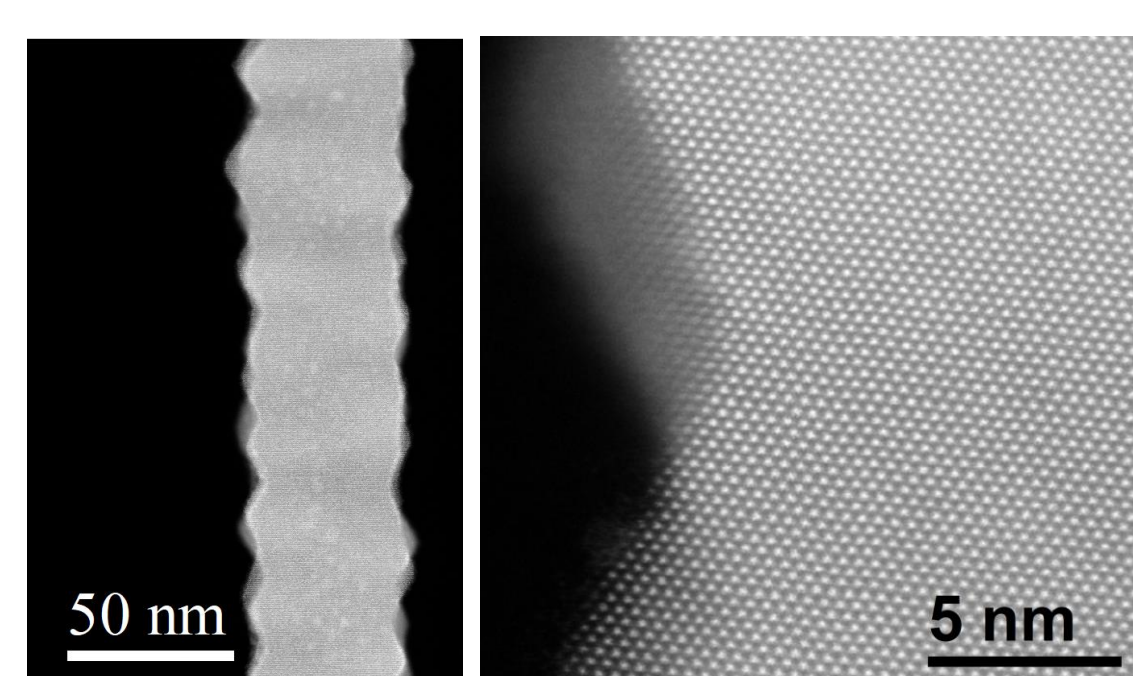
STEM image of PVP capped Au nanoparticles (left) and false color TEM image of mitochondrion (right) both in aqueous solution

##### In-Situ Catalysis

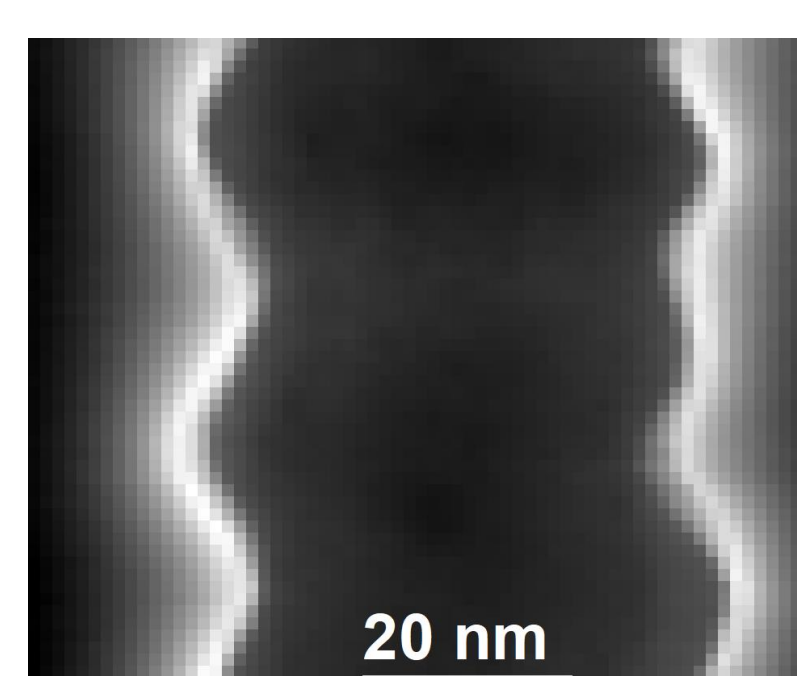
##### In-Situ Life Science

##### Nanostructures

##### Material Science

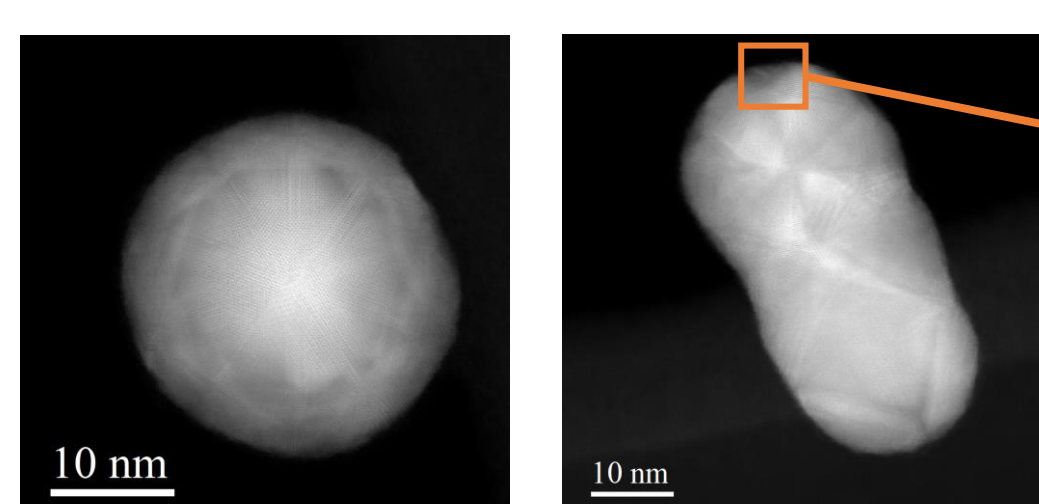


PbS zig-zag stripes with Pb terminated facets forming a surface conductive layer

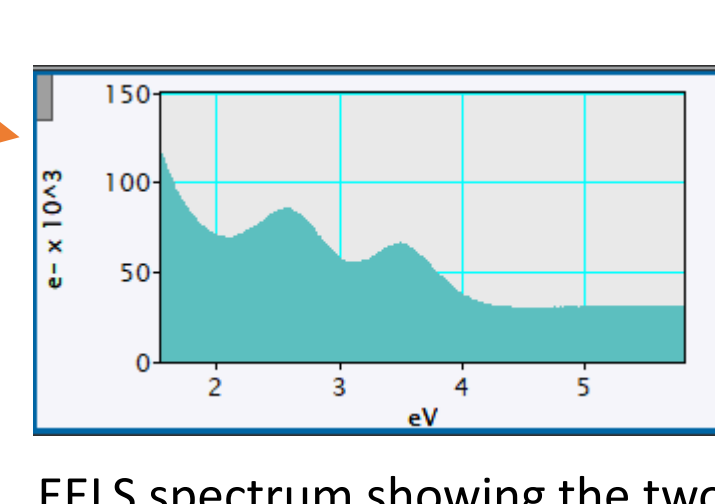


Spatial distribution of the surface plasmon polariton extracted from an EELS map

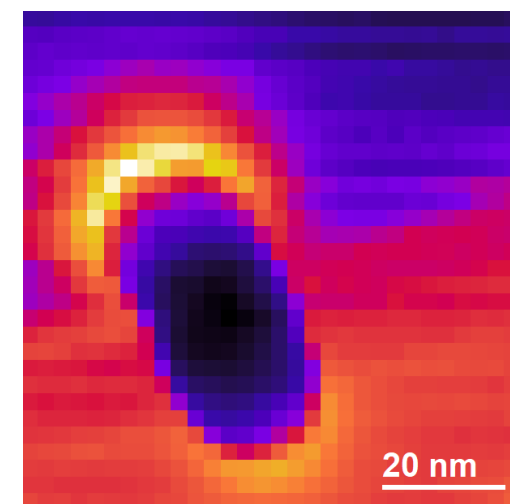
###### Low Energy Excitations / Plasmons



HAADF-STEM images of Ag cluster and dimer

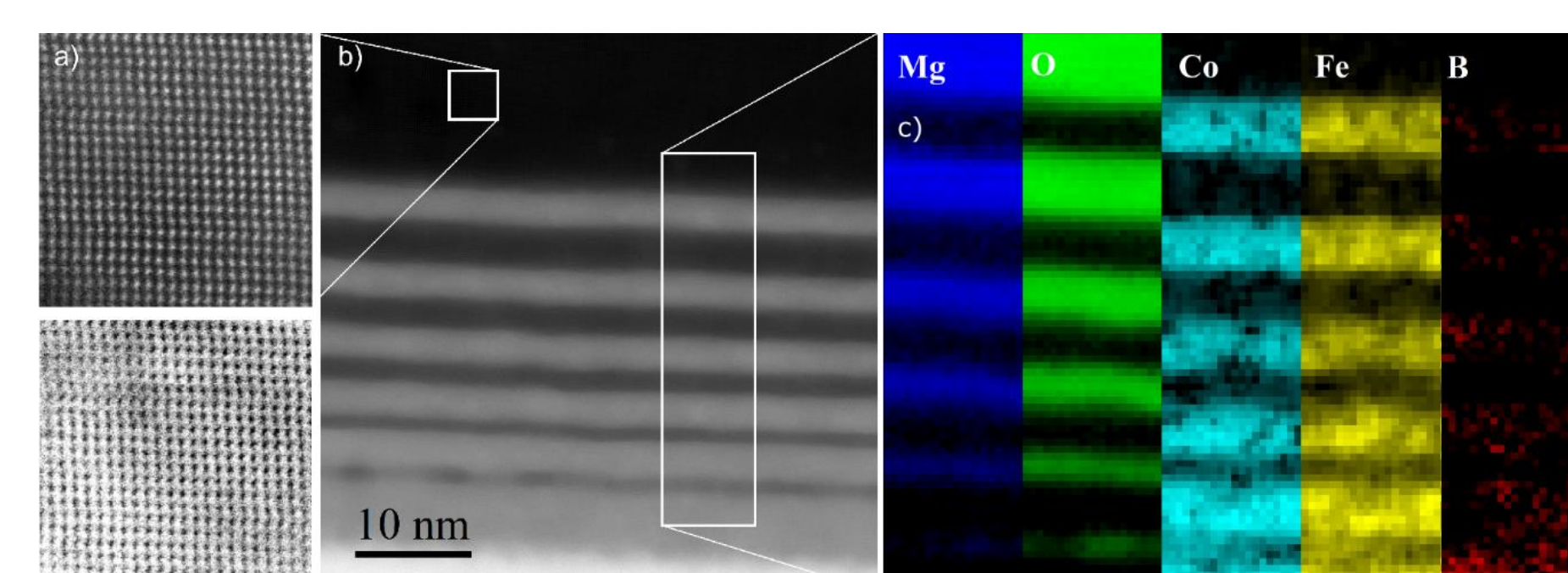


EELS spectrum showing the two plasmon modes of a dimer



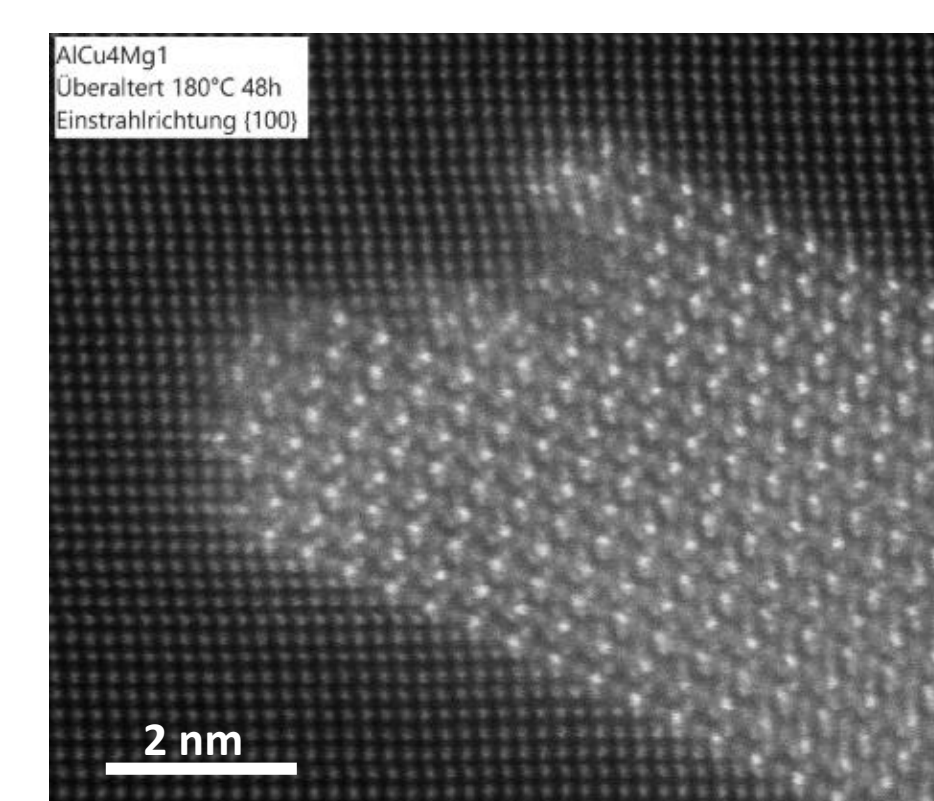
Map of surface plasmon from dimers long axis

- Analysis of localized surface plasmon resonances by **EELS**
- → connection to optical properties
- Splitting of resonances visible due to high energetic resolution below 0.3 eV
- Mapping of plasmon modes



High resolution STEM images (a,b) and EELS element mapping (c) of a model layer system with several interfaces (sample from Prof. Michael Seibt, University of Göttingen)

- Analysis of interfaces by **atomically resolved STEM** with high elemental contrast
- Element analysis by **EELS** or windowless **EDX** (>1sr)
- Thickness maps (not shown) with imaging EELS filter



HAADF-STEM of a precipitate in Al matrix