Correlated in-situ Analysis of 2D Materials with AFSEM™
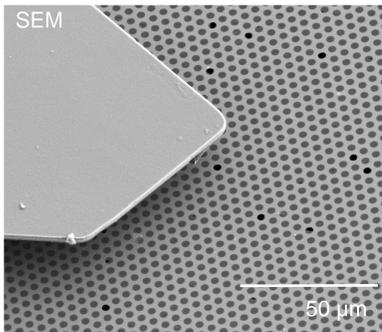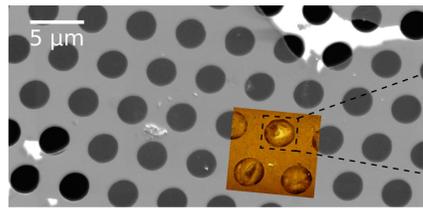
Interactive correlative analysis of graphene membranes on the nanoscale in your SEM/FIB

Correlative SEM/AFM analysis using AFSEM - From probe positioning to quantitative nanomechanical analysis


Region of interest

SEM-guided easy identification and cantilever positioning on graphene

**Correlative AFM/SEM microscopy**

Correlative SEM and AFM analysis of unsupported graphene and graphene-related materials. In low-voltage SEM, a sample of unsupported graphene sheets can be screened to identify the presence of layers and their thickness. Areas of interest can then be imaged with higher resolution and better contrast using AFSEM.

Force increase → Force increase → Force increase →
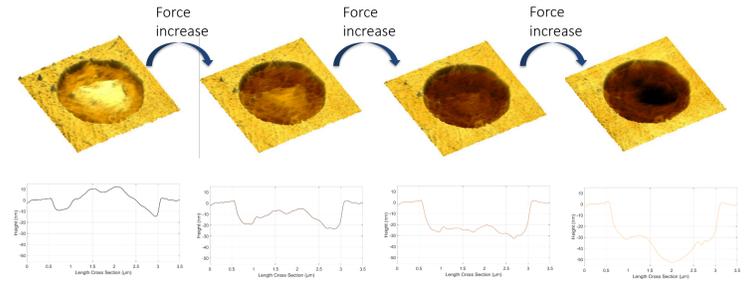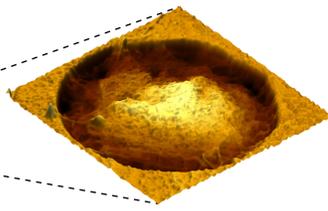
Graphene: Nanomechanics

Force-dependent deflection and simultaneous topography measurement of graphene membrane with sub-nm resolution. The displacement is quantified in the cross-sectional measurements using AFSEM.
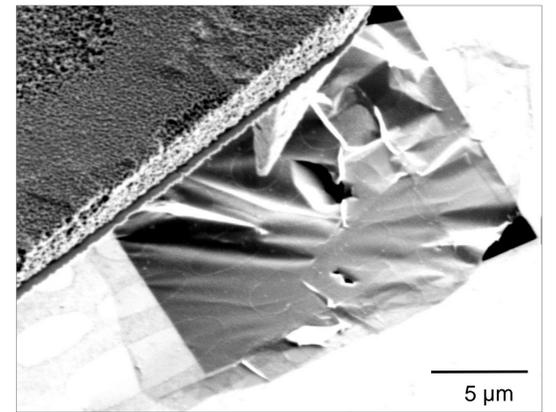
The AFSEM concept and user benefits
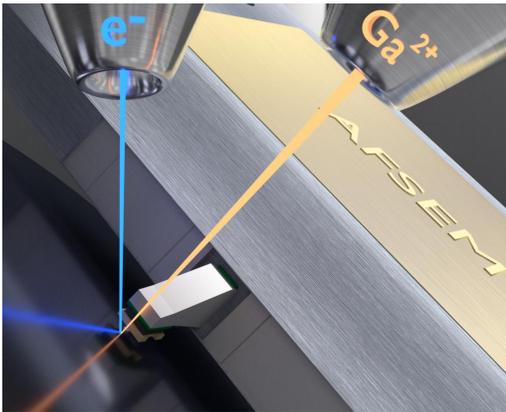
Use your SEM/FIB/AFSEM for truely **interactive analysis**

- with no restriction on sample size
- without breaking vacuum
- for real 3D topography, C-AFM, MFM, additive & substractive tomography and mechanical analysis

Self-sensing cantilevers provide high resolution AFM images within a minute

Correlative microscopy

SEM/FIB and AFM at the same region of interest without breaking vacuum and exposing the sample to air
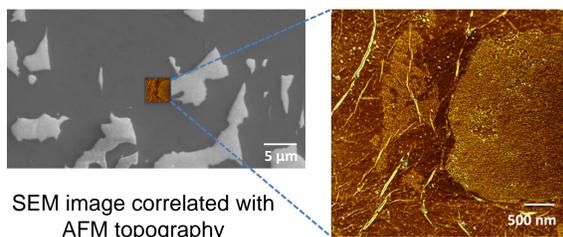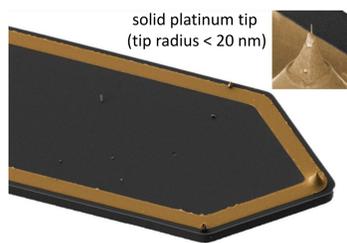
AFM & conductivity measurement

Measure conductivity and topography with *pA* and *nm* resolution simultaneously

Nanomechanical analysis & 2D materials

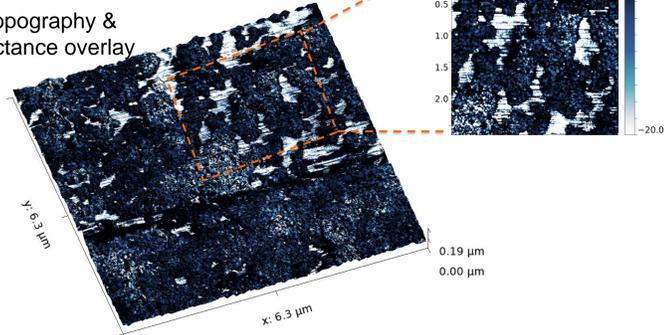Manipulate 2D materials with AFM tip and measure nanomechanical properties simultaneously

In-situ conductivity analysis of graphene

solid platinum tip (tip radius < 20 nm)

Conductive Self-Sensing Cantilever
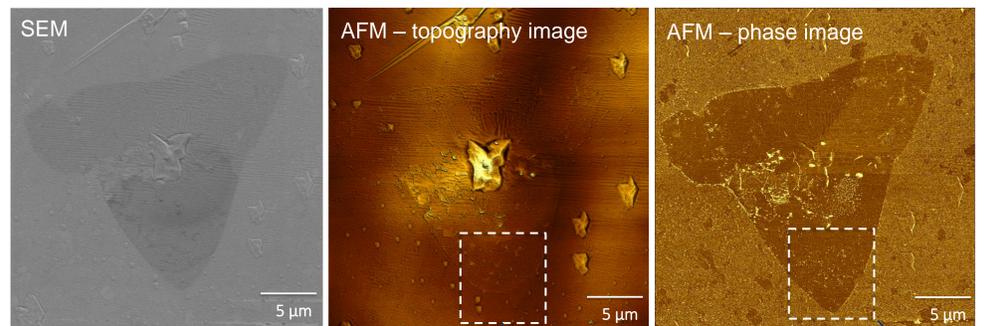
SEM image correlated with AFM topography

3D topography & conductance overlay

Combine SEM and AFSEM for *in-situ* correlative topographical and conductive analysis of 2D materials

Boron-Nitride Monolayer Growth

SEM AFM – topography image AFM – phase image

SEM-guidance

Monolayers not accessible without SEM-guidance. Topography measurement of graphene membrane with sub-nm resolution using AFSEM.

3D topography image and phase image of Boron-Nitride monolayers on Nickel
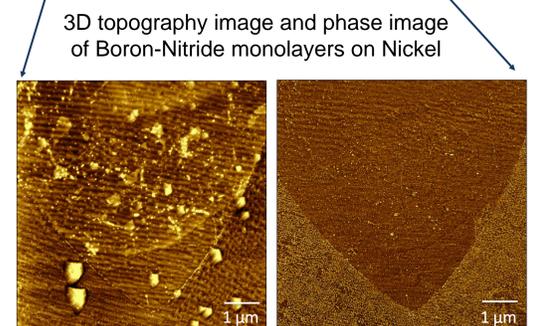
SEM guidance enables topography imaging of 2D materials with sub-nm resolution using AFSEM

AFSEM – Combine the strengths of SEM/FIB and AFM **interactively**