NANOMAGNETICS INSTRUMENTS

Advanced Physical Property Characterization System (APPCS)

System Specifications

- Cryogen-Free Cryostat
- 5T/7T/9T/12T/14 Tesla Solenoid Magnets
- Up to 9-2-2 Tesla and 12-3 T Vector magnet
- ≤ 1.5-400K Temperature Range
- ±2 mK temperature stability <10K
- 50 mm diameter variable temperature insert (VTI)
- Optional Vibration Isolation for 0.5 Å noise levels
- Fully automated software with scripting features, software upgrades are free lifetime

Physical Properties measurement options

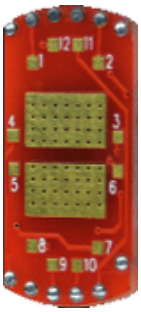
- Vibrating Sample Magnetometry (VSM)
- DC / AC Electrical Transport & Hall Effect
- AC Susceptometer (ACMS)
- Specific Heat
- Thermal Transport
- Torque Magnetometry
- Motorized Horizontal & 2 Axis ("Swedish") sample rotators

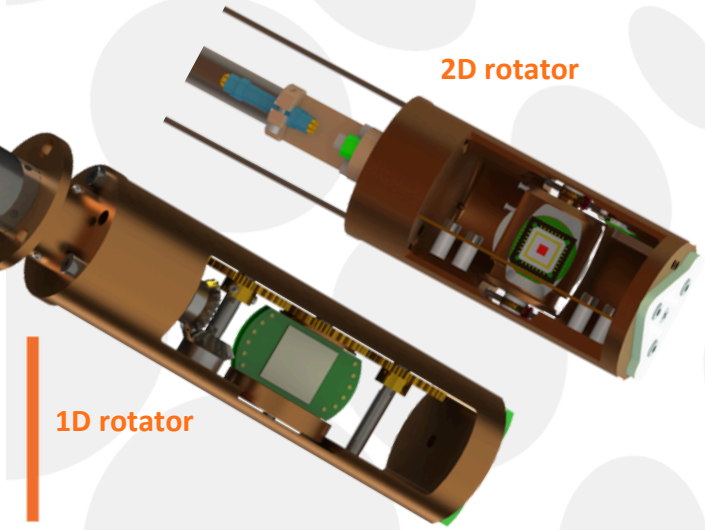
www.nanomagnetics-inst.com sales@nanomagnetics-inst.com +44 7906 159 508

Advanced Physical Property Characterization System (APPCS)

Static Insert :

- Six contacts Hall effect/ four contacts van der Pauw measurement
- Sample size: max 15mm x 15mm
- Up to 44 contacts to sample
- 49mm OD sample insert (other sizes are optional)
- 25 spare sample holders
- Measurement electronics and control software





Rotary Insert (Vertical and Horizontal Rotator)

- Rotation: 0°-360° with 0.01° resolution
- Sample size: max 5mm x 10mm
- Up to 28 contacts to sample
- 49mm OD sample insert (other sizes are optional)
- 25 spare sample holders
- Measurement electronics and control software

DC Resistance / Hall Effect Measurements

- Source current programming range: 150pA to 1A*
- Voltage measurement range: 100mV (100nV resolution) to 100V (10µV resolution) *
- Resistance Range: 5µΩ to 10GΩ

AC Resistance / Hall Effect Measurements

- Source current programming range: 2nA to 100mA Frequency range: 1Hz to 1kHz
- Real and imaginary parts of impedance Z(T)
- Voltage noise (with low noise voltage preamplifier): 1nV/Hz noise floor at 1kHz at 60dB gain

AC Susceptibility Measurement

- Sample Size: Max 5 mm diameter
- AC Frequency Range: 10Hz to 10kHz
- AC Field Amplitude Range: 2mOe to 150e
- Sensitivity: 2 E-7 emu (2 E-10 Am^2 at 10kHz)
- Real and imaginary parts of susceptibility χ (T)
- Calibrated sensor at sample stage/pick-up coils
- Measurement electronics and control software

Note: Specifications are subject to change without notice.

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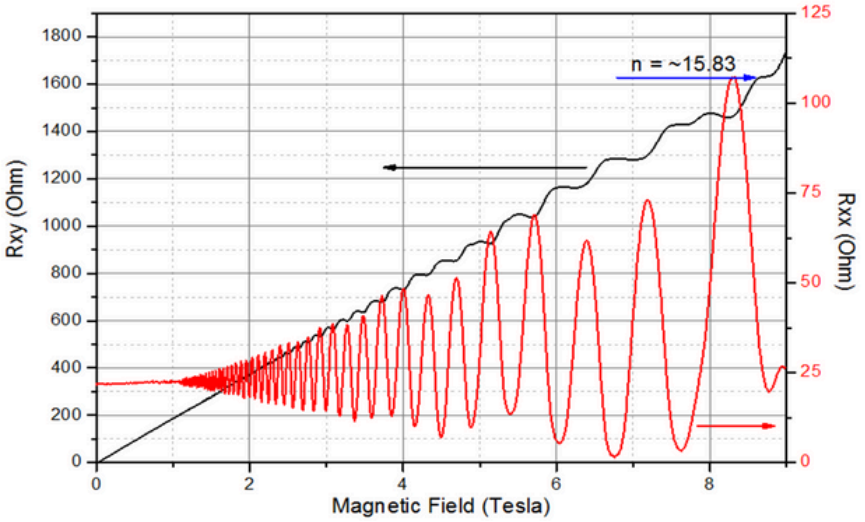
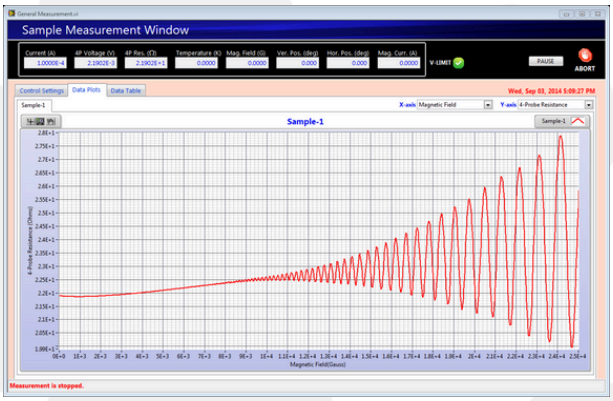
Magnetoresistance and Hall effect measurements

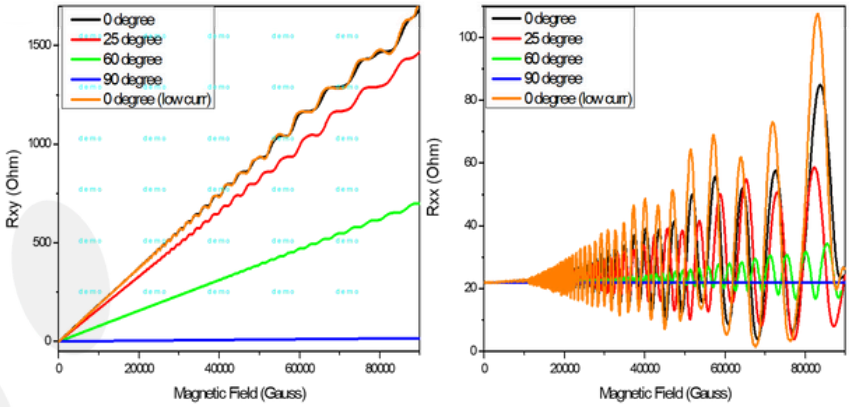
Shubnikov de Haas Oscillations in GaInAs Quantum well



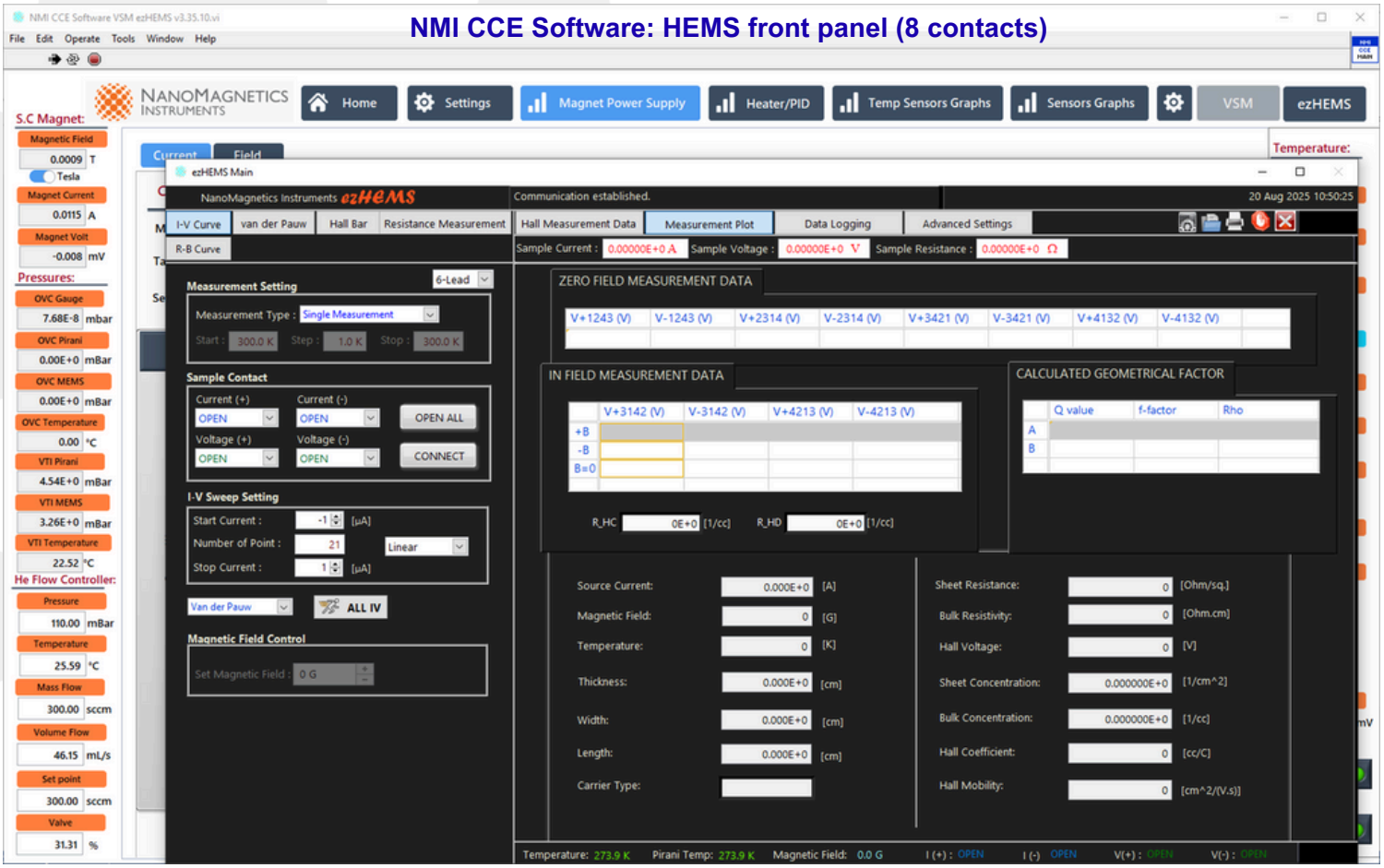
Features

- Rxx vs Magnetic Field @ Theta , Temperature
- Rxy vs Magnetic Field @Theta , Temperature





NMI CCE Software: HEMS front panel (8 contacts)

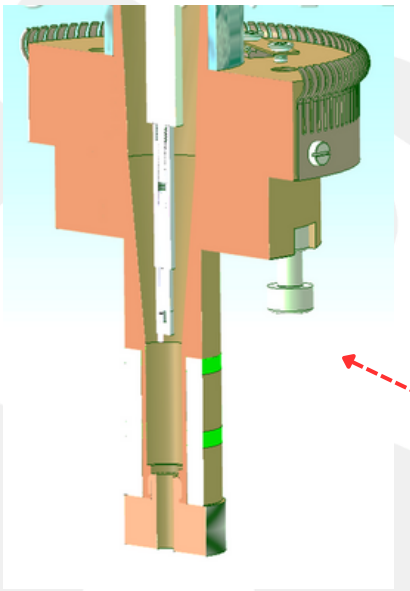


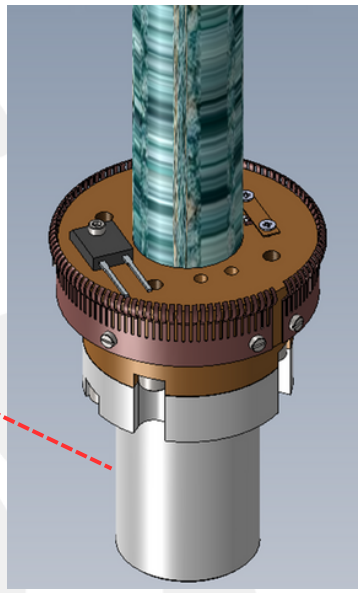
NANOMAGNETICS INSTRUMENTS

Advanced Physical Property Characterization System (APPCS)

VSM System Specifications

- **Sensitivity :** 5E-7 emu RMS ,
- **Sample size:** 5 mm or 12 mm diameter
- **Accuracy** <1%
- **Windows based Data Acquisition and analysis software**



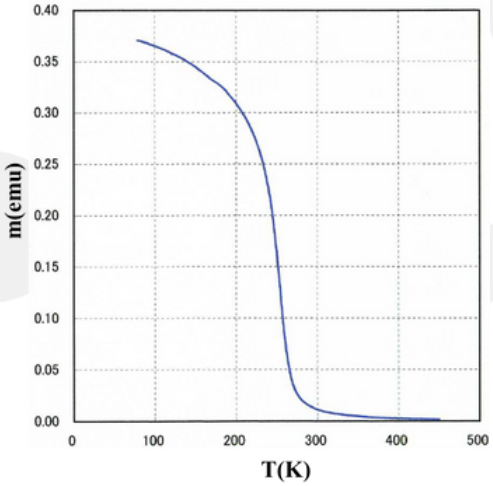


Automatically calculated parameters with analysis software:

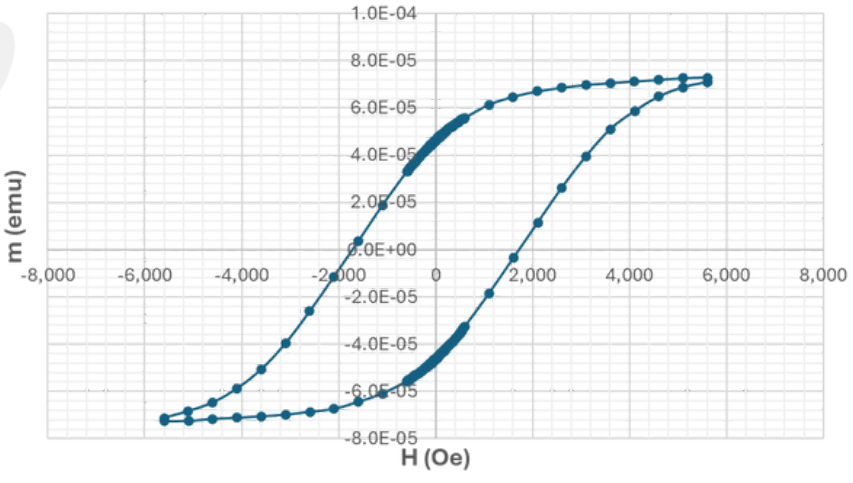
- Coercive Field (Hc)
- Saturation Magnetization (Ms)
- Coercive Field (Hc) Offset
- Remanent Magnetization(Mr)
- Initial Slope (dM/dH |H=0)
- Nucleation field(Hn)
- Saturation field(Hs)
- Area enclosed by the hysteresis loop
- Slope at Coercive Field (Hc)

LT VSM _Observed data

Ceramic Thin Film
3x3x0.07mm @ m vs temp 77-450K



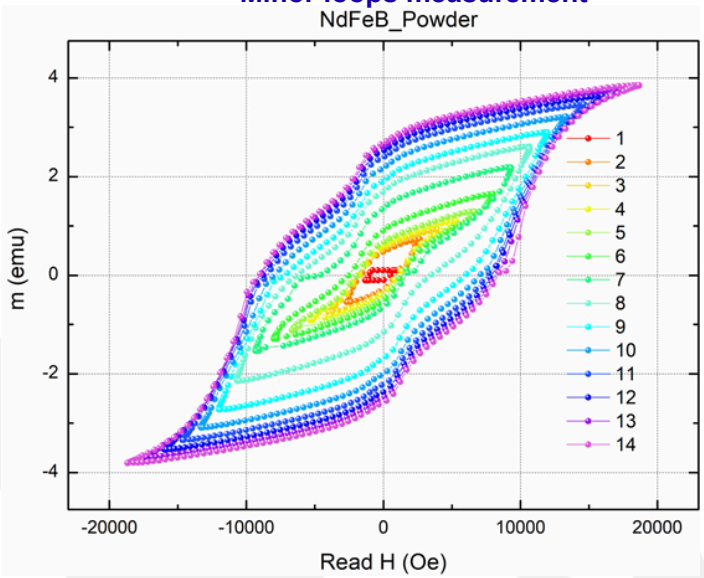
m (emu) vs H (Oe) for Floppy Disk Sample @ ~ 3.5K



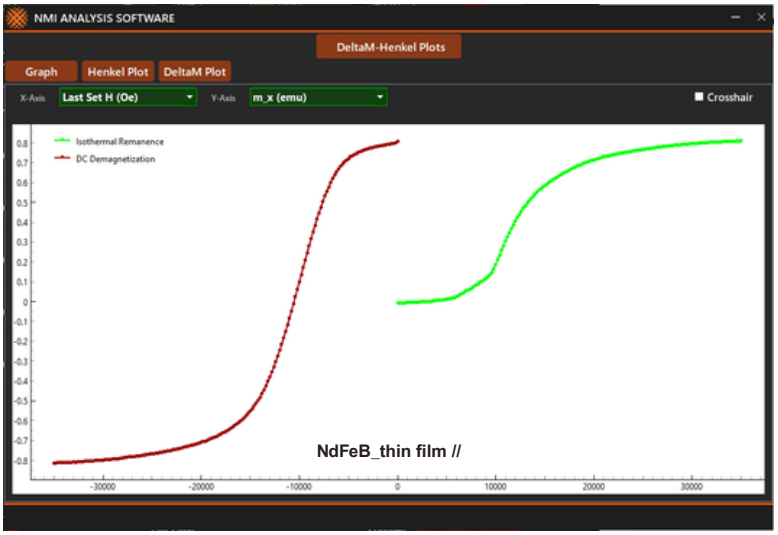
NANOMAGNETICS INSTRUMENTS

Advanced Physical Property Characterization System (APPCS)

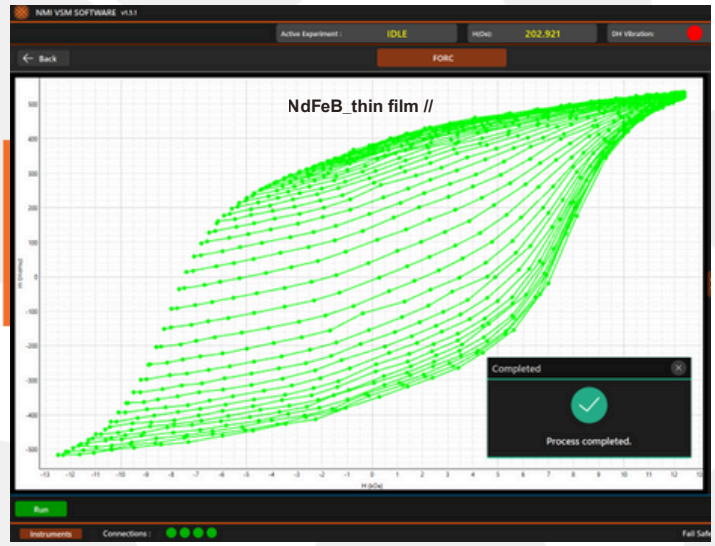
Minor loops measurement



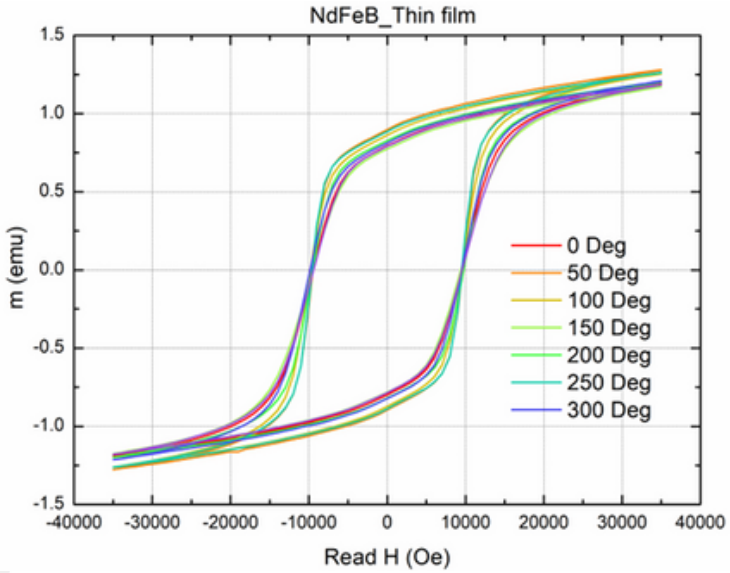
Delta M-Henkel plots



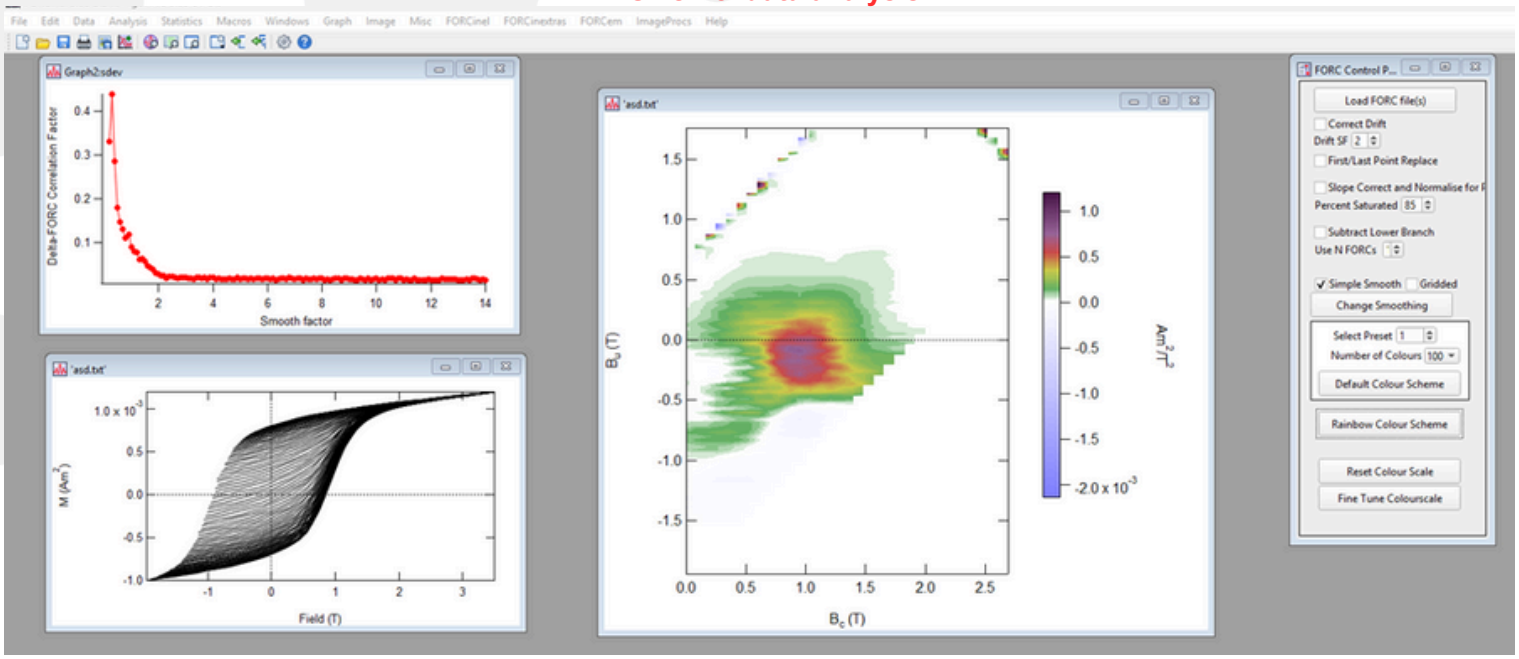
FORC measurement



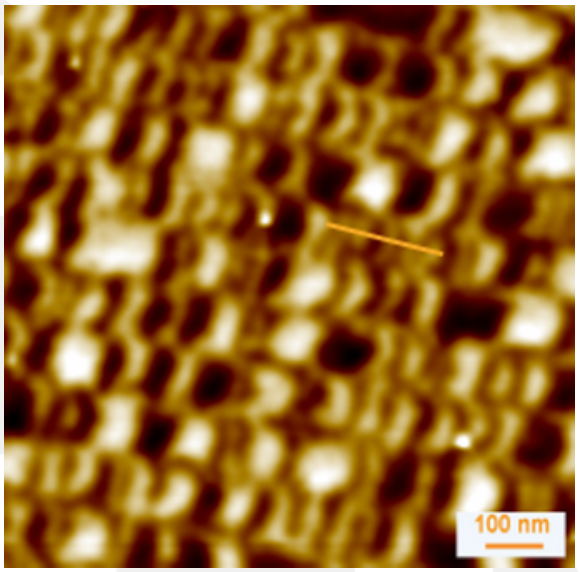
Rotational Hysteresis measurement

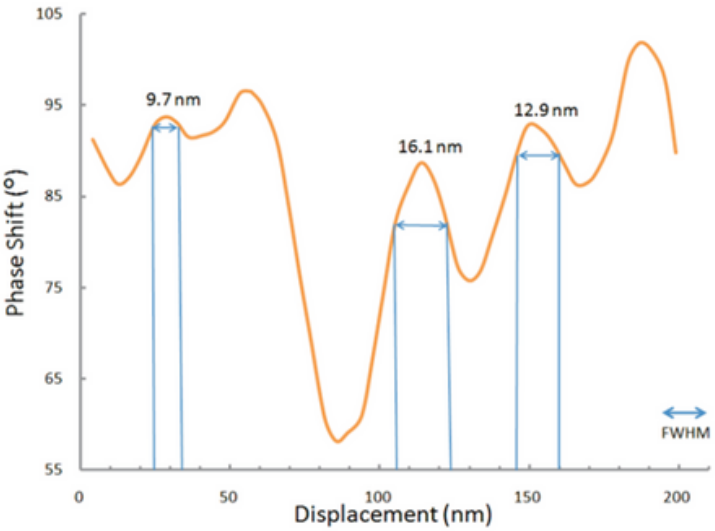


FORCinel data analysis

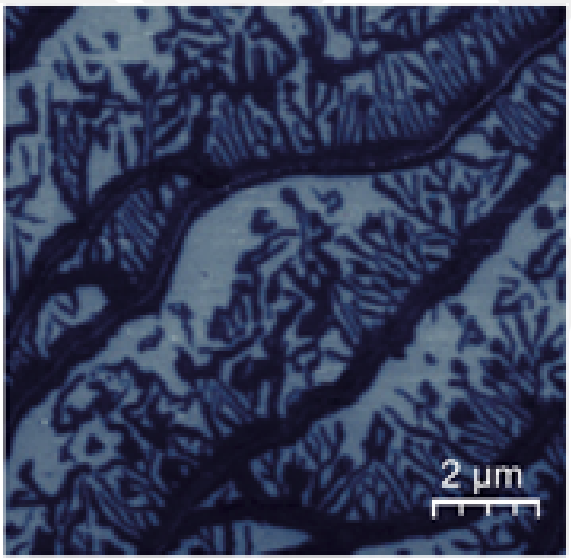


Low Temperature Scanning Probe Microscopes
Low Temperature MFM/AFM
SPM Controller

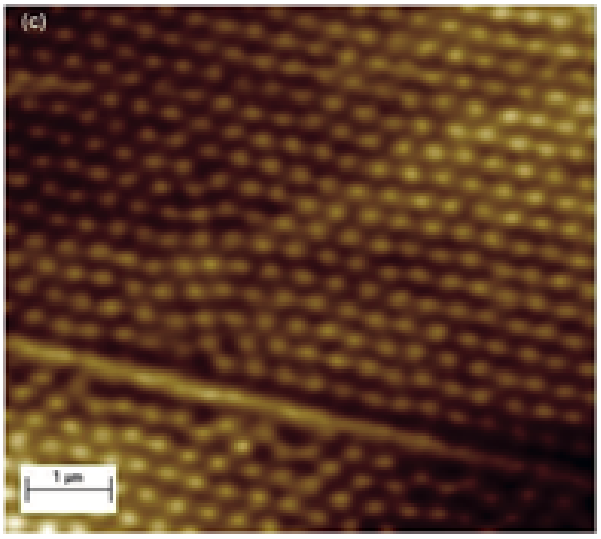




LT-MFM image and cross-section of an HDD

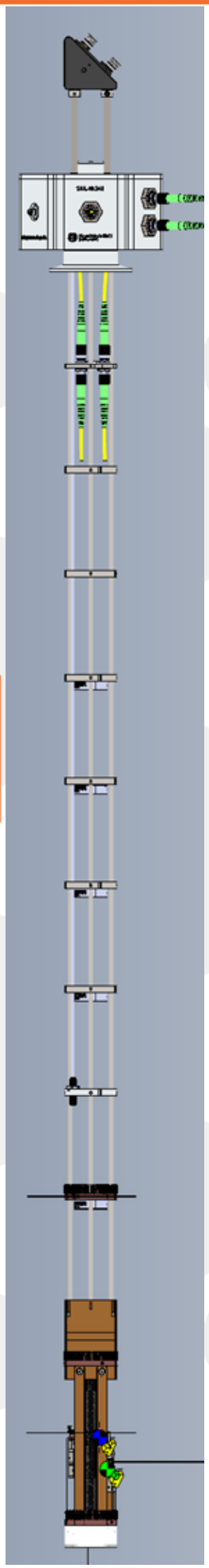


KPFM image of $CaFe_2As_2$

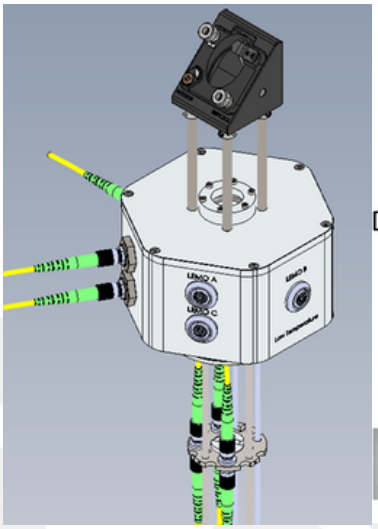


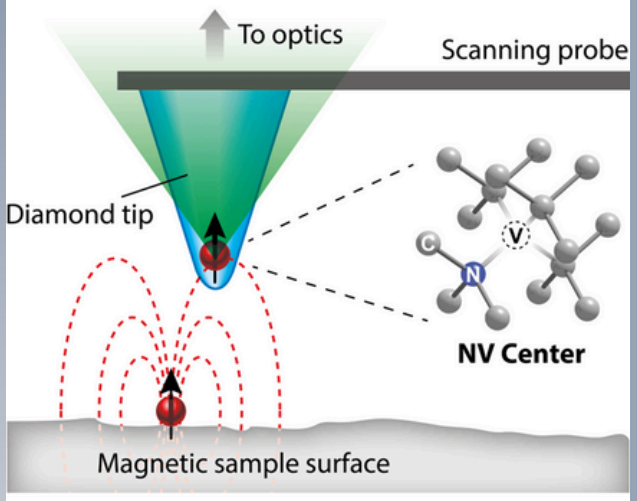
LT-MFM image of
vortices in BSCCO at 4.5 K

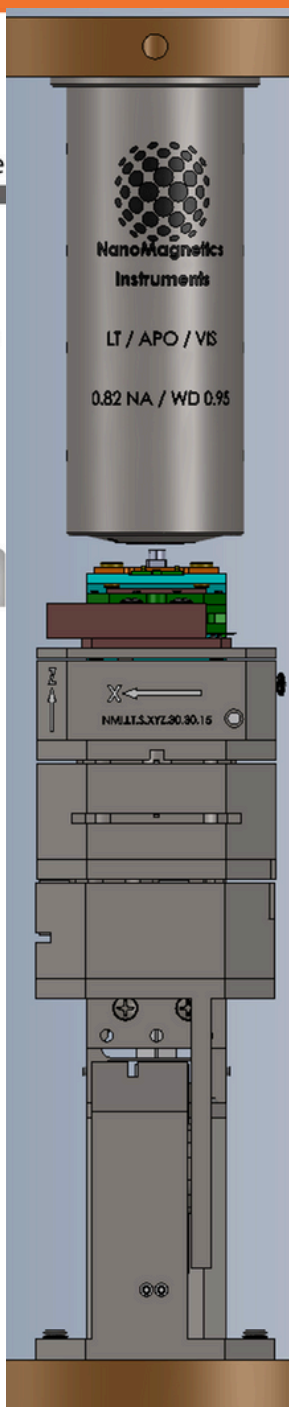
- 1fm/√Hz Noise Level
- 1.5K – 400K Temperature Range
- Optical Microscope integration



Low Temperature Scanning NV Centre Microscope

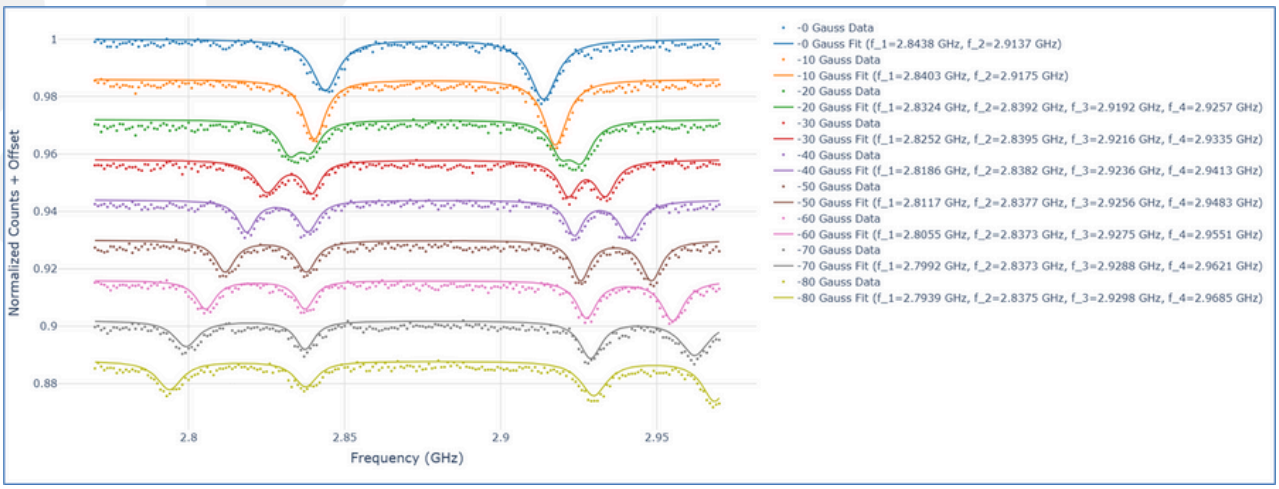




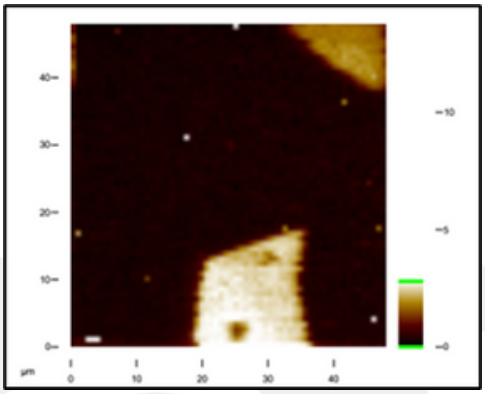


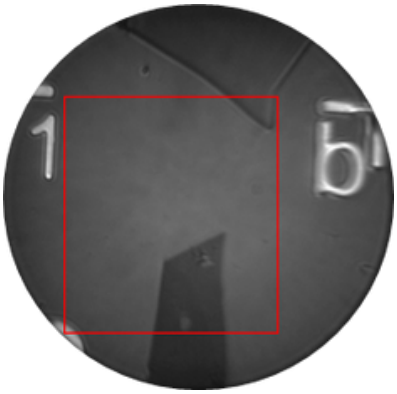
- High NA Objective, 0.82NA / 0.95mm WD
- 532nm, SLM 10mW Laser
- 30µm x 30µm x 15µm Scan area @ 4K
- 48mm Outer Diameter
- 10mK to 300K temperature range
- APD for single photon detection
- Ø 1 inch Optical Orifice & Relay Lenses
- 3 Fiber Feedthrough, 2 RF Input Channels
- 24x24 mm Footprint XYZ Sample Nanopositioners
- 24x24 mm Footprint Flexure Scanner
- 14mm Footprint XYZ Probe NV Sensor Nanopositioners
- API & SDK Scanning Unit & Nanopositioners
- APD Single Photon Counter
- Microscope Camera & White Light Illumination
- Spectrometer Interface
- RF Source
- Integrated RF Antenna for ODMR
- 8 Spare DC Contacts to Sample Holder
- Temperature Sensor & Heater Underneath the Sample

2.8K Test, RF Power dependence, Bulk NV Sample

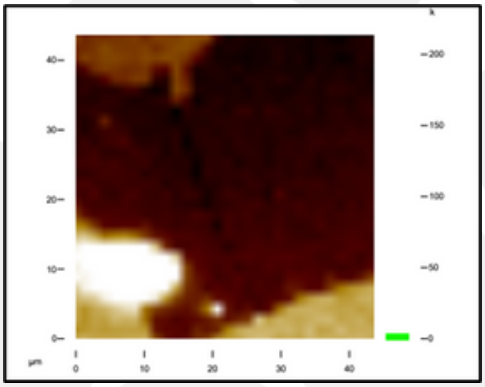


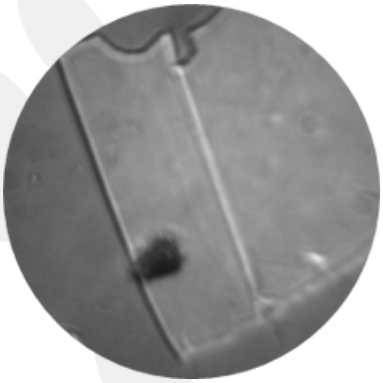
Scanning Spectral Mapping Options/ CFM and NV magnetometer



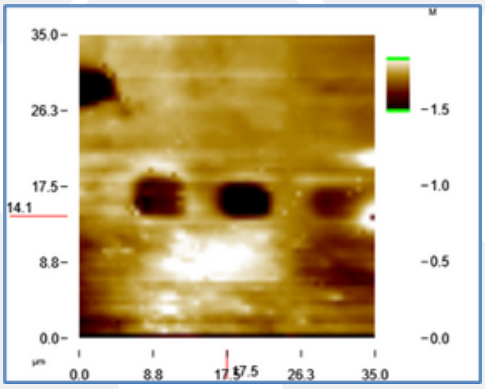


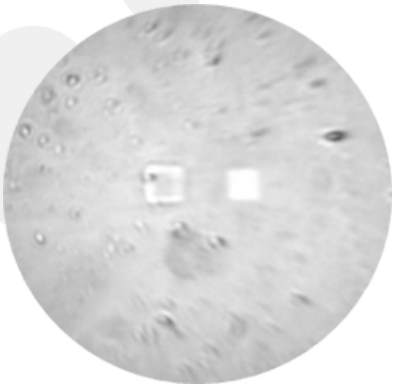
Graphene



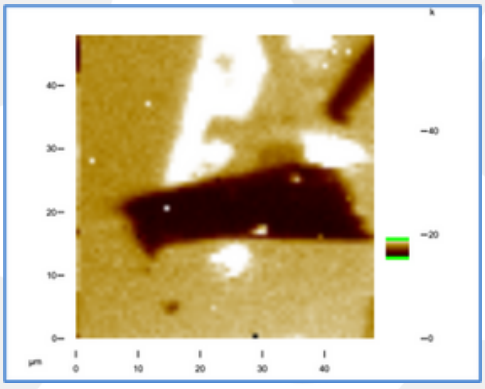


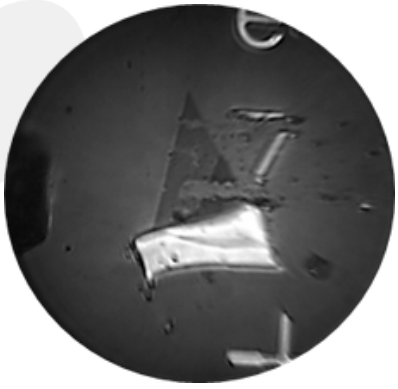
hBN





Processed Single Crystal Diamond with NV Center





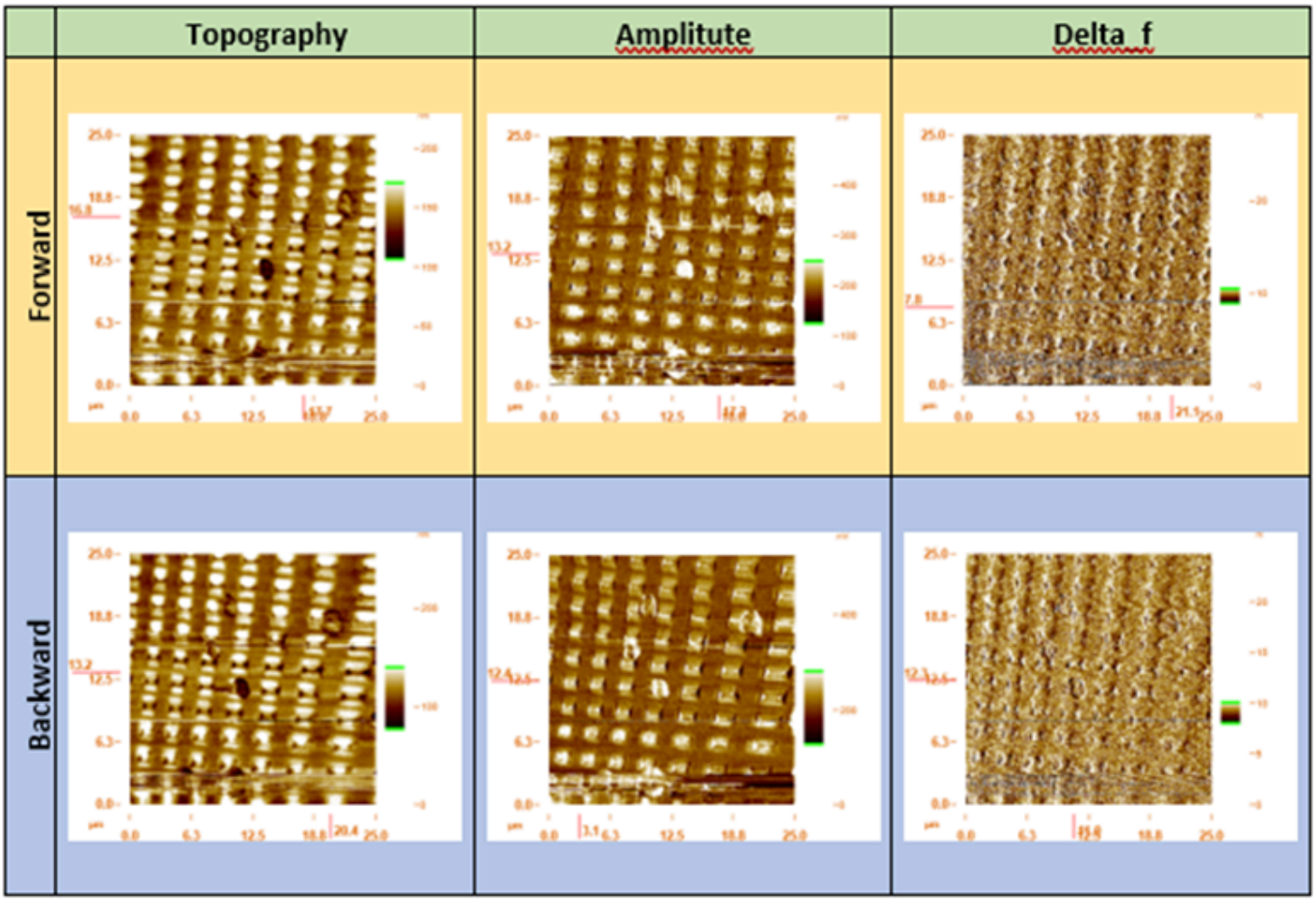
MoSe2

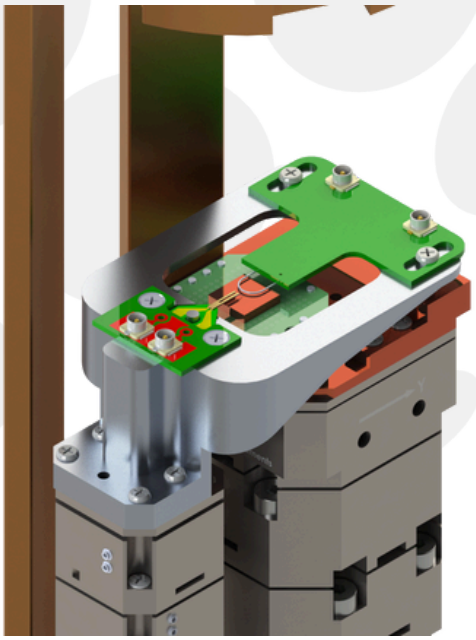
Raman map

Optical Microscope Image

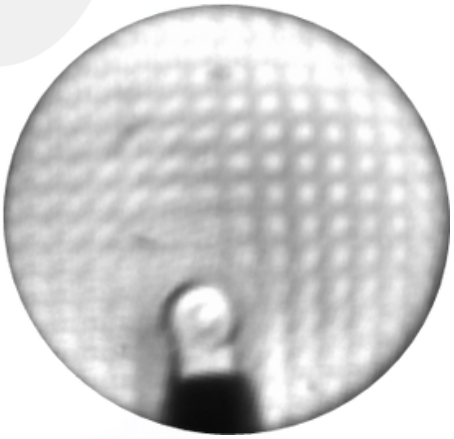
Low Temperature Scanning NV Centre Microscope
2.8K Test, AFM Imaging, Calibration Grating

hpSPMPlus_No1_NV_MAGNETOMETER_AFM_SHPM_sca25µm_spd5_px256_2025.02.18_13.01.03





Optical Microscope Image
Showing NV Centre Tip



AFM Image