



海纳光学

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Easy Sample Exchange:

Designed for convenience and precision, the top-loading sample rod enables quick sample changes without compromising alignment

Multiple-Magnet Configurations:

With 2.5T/3T/3.7T

Specifications:

Field resolution: 1 mOe.

• **Field Ramp Rate:** >1T /sec

• **Auto Rotation range:** $\pm 360^\circ$ (in the magnetic field plane).

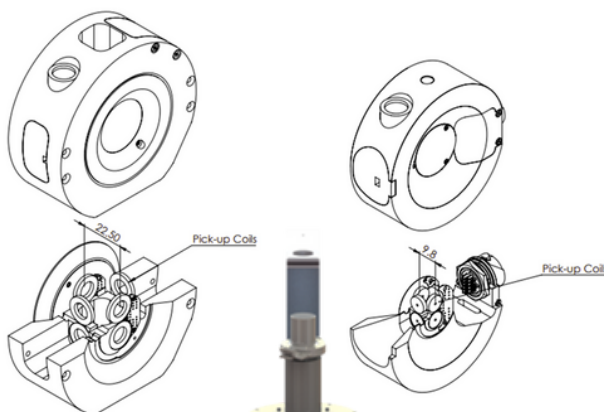
• **Angular resolution:** 0.1°

• **Accuracy and repeatability:**
 $\pm 0.2^\circ$

• **Vector Detection Coils:** 8 sensing coils, arranged as 4 pairs for simultaneous measurement of the X and Y vector components of the magnetic moment.

• **Magnetic moment sensitivity:**
 $< 5 \times 10^{-7} \text{ emu}$.

• **Continuous operation from 80 K to 1273K** without requiring any hardware changes.



Anisotropy Measurements :

- Equipped with a vector coil set and automated sample rotation for characterization of magnetic anisotropy.
- Torque curves and angular-dependent measurements

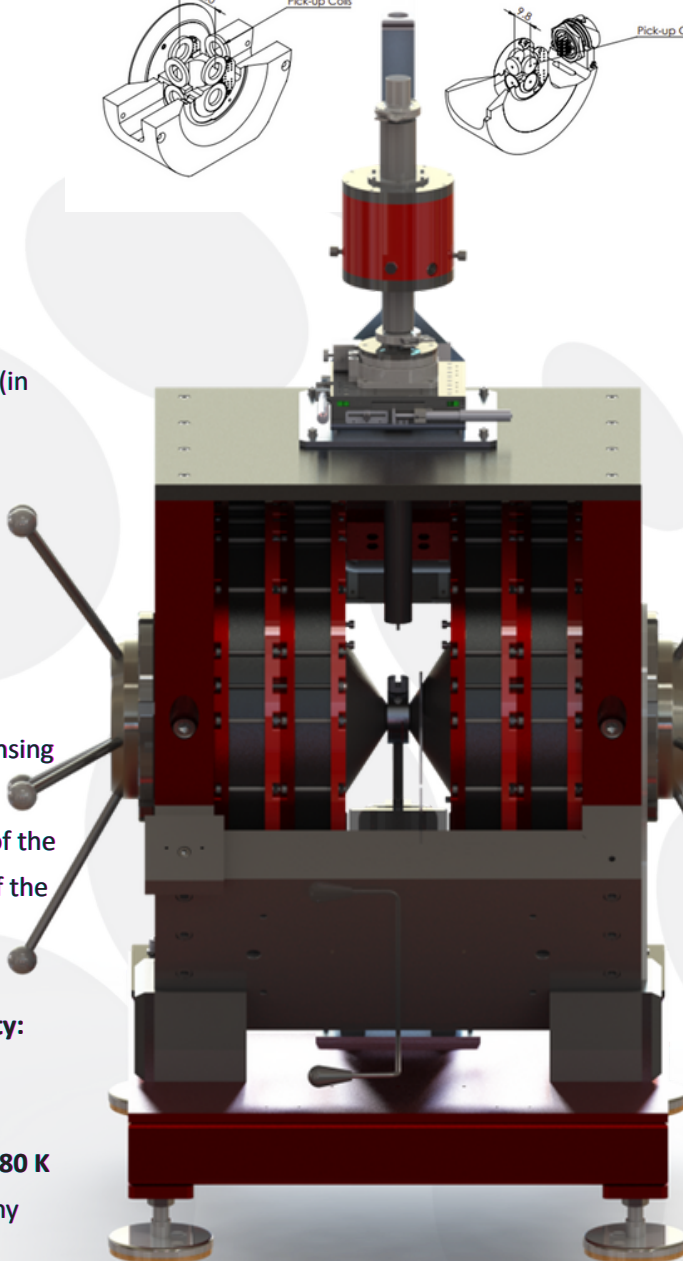
Fully Automated Measurement and analysis Software :

Our software delivers complete automation of VSM measurements from **sample positioning** and **coil calibration** to complex experimental routines.

Supported measurements Techniques

- Demagnetization,
- Hysteresis,
- Minor loop,
- FORC,
- Rotational hysteresis,
- Torque curves,
- DC demagnetization (DCD) remanence,
- Isothermal remanence (IRM),
- ΔM -Henkel plots,
- Magnetic moment vs. time
- Magnetic Moment vs temperature-dependent measurements (ZFC, FCC, FCW).

Each measurement is precisely controlled and reproducible, ensuring seamless operation and reliable magnetic characterization.



Variable Temperature:

Our versatile temperature control modules from **80 K to 1000 K**, covering cryogenic to high-temperature regimes. Fully integrated with the electromagnet system, this capability provides the broadest temperature span available in any electromagnet-based VSM.

Sample Holders:

Designed for versatility VSM system with sample holders suitable for **thin film, bulk, liquid, and powder samples**. Precision engineering ensures reliable positioning, minimal background signal, and consistent magnetic response across all sample types.

Vibrating Sample Magnetometer (VSM) System VSM-300-EM

Sensitivity & Performance

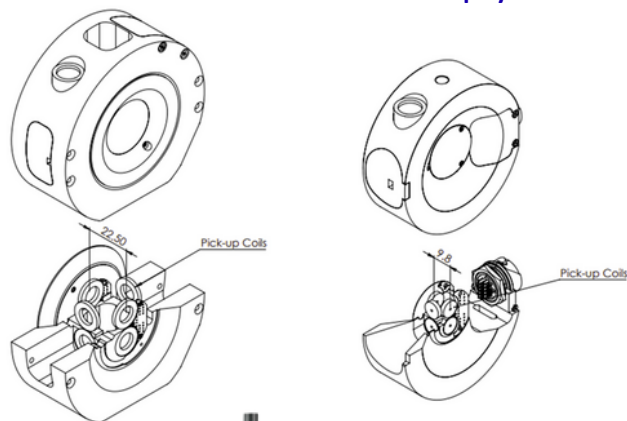
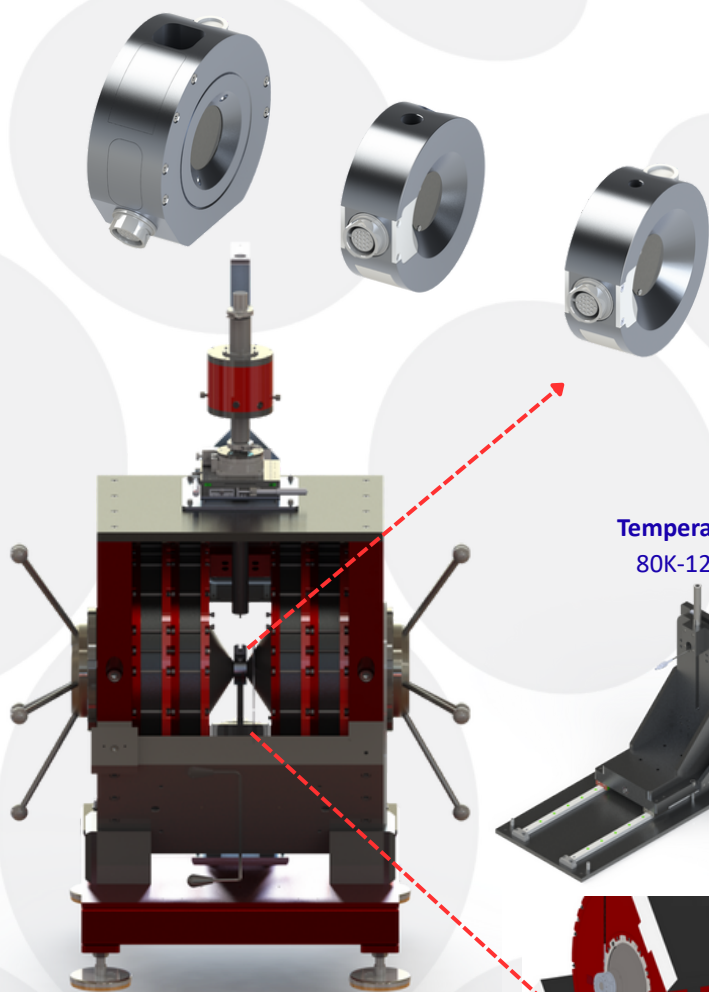
Sensitivity X Coils (emu)	<5E-7 emu RMS
Sensitivity Y Coils (emu)	<1.2E-6 emu RMS
Dynamic Range	1E-6 to 1E+3 emu
Moment Stability	Better than $\pm 0.05\%$ of full scale/day for fixed coil geometry at constant field and temperature
Moment Accuracy	Better than 1% of reading $\pm 0.2\%$ of full scale with a geometrically identical test sample and calibrant
Sample Mass	0-10 grams

Temperature option

	Cooling	Heating
Temperature Range (K)	<80-300	300-1,273
Coolant	Cooled Ar or N2 gas & LN (30L Liquid N2 Dewar is included.)	-
Gas with cylinder & regulator	N2 or Ar	N2 or Ar
Temperature Stability (K)	0.1K	0.1K
Temperature Resolution (K)	0.001K	0.001K
Temperature Ramp Rate (K/min)	10 K/min	10 K/min
Temperature Control	PID & Gas Flow Rate	PID & Gas Flow Rate

Coil-sets

Inside: 8-Coil vector detection Pick-Up System



Temperature:
80K-1273K

VSM with 3.7T Electromagnet



VSM with 2.5T Electromagnet

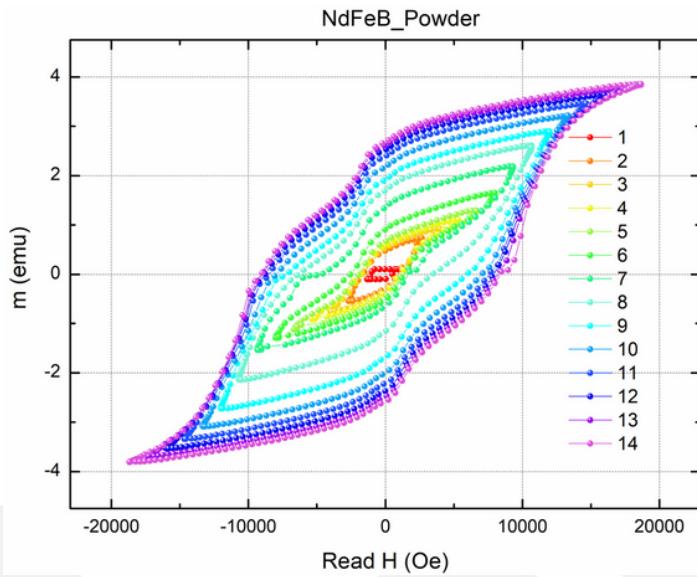


Electro Magnet Options

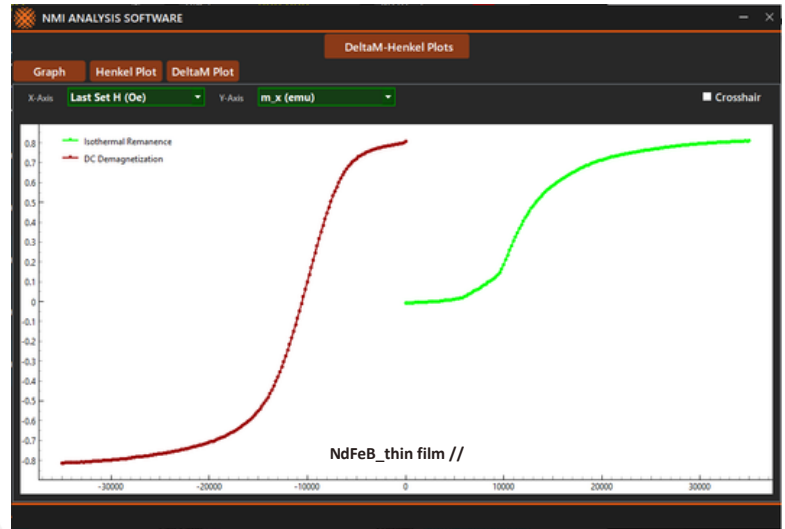
	2.5 Tesla	3 Tesla	3.7 Tesla
Pole Diameter (mm)	100	150	250
Pole Face Diameter (mm)	50	50	25
Sample Size at room temperature (mm)	3.5 - 10mm	3.5 - 10mm	3.5 - 10mm
Sample Size for oven & cryostat (mm)	3.5 - 6mm	3.5 - 6mm	3.5 - 6mm
Field at 10mm Pole Gap (Tesla)	3.5 - 6mm	3	37
Field Accuracy	±1% of reading or ±0.05% of full scale		
Field Resolution	100 nT (1 mOe)		
Pole Gap Adjustment Range (mm)	0-120	0-120	0-120
Magnet Power Supply Power (kW)	3	5	10
Magnet Water Cooling Rate	5 L/min	7 L/min	12 L/min
Cooling Water Temperature (°C)	5-25	5-25	5-25
Magnet Power Supply Cooling	Air	Air	Air
Magnet Ramp Rate (T/s)	>1.0	>1.0	>1.0
Hole in the Magnet Poles & Pole Faces for Optical Experiments	10mm	10mm	10mm
Sample Rotation Resolution (°)	0.1°	0.1°	0.1°



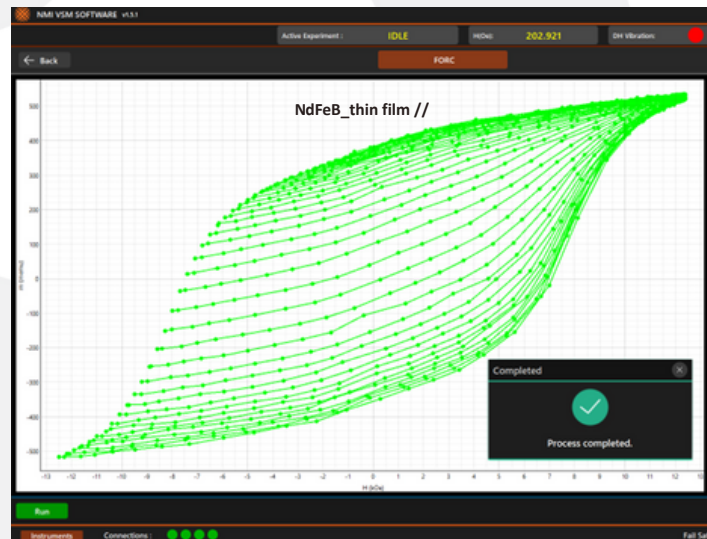
Minor Loops Measurement



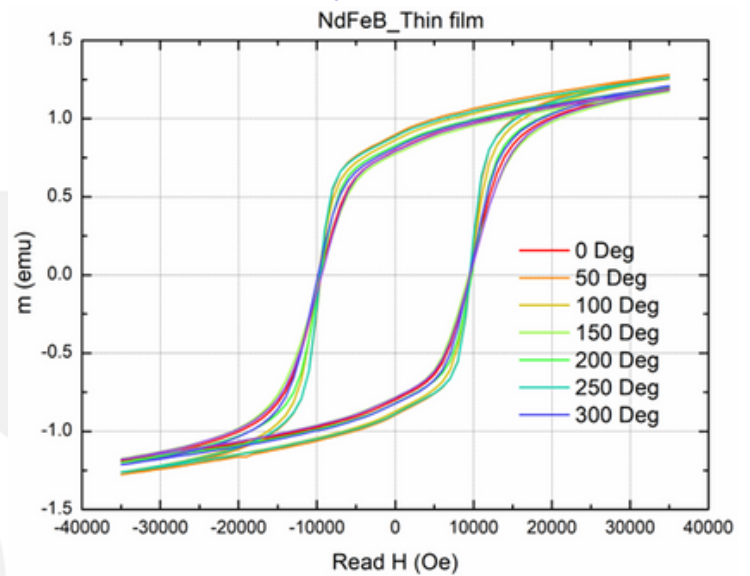
Delta M-Henkel plots



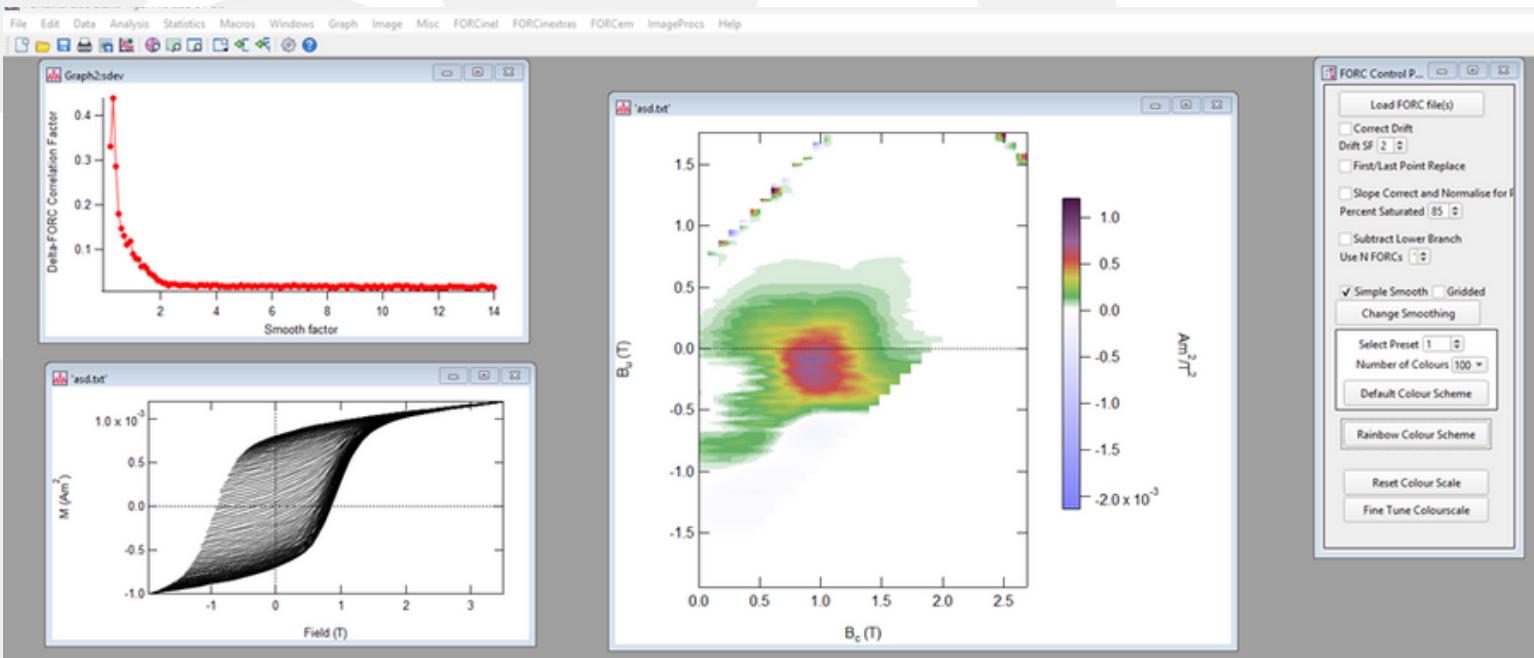
FORC Measurement



Rotational Hysteresis Measurement

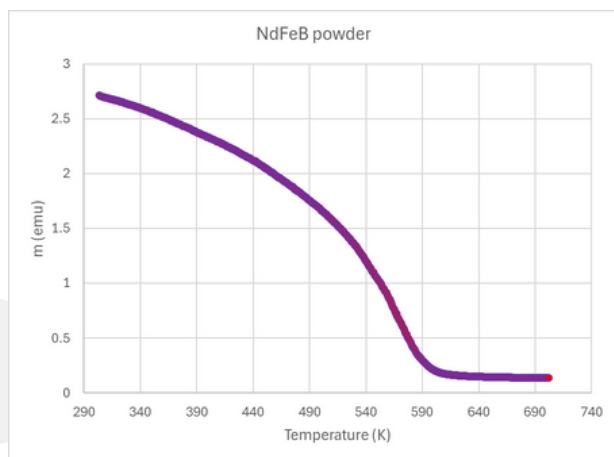


FORCinel data analysis

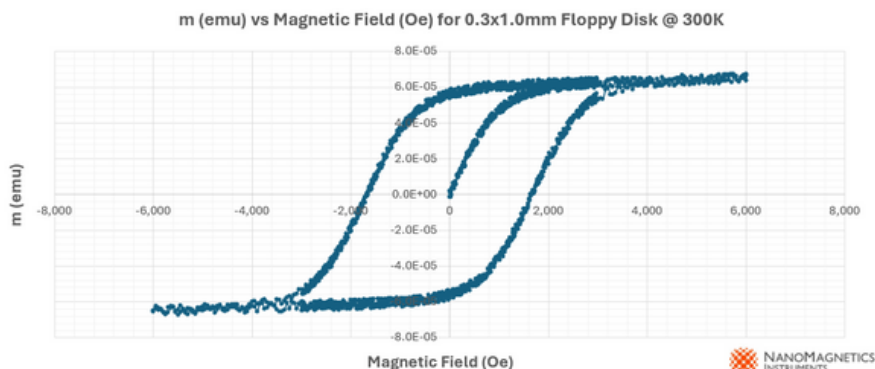




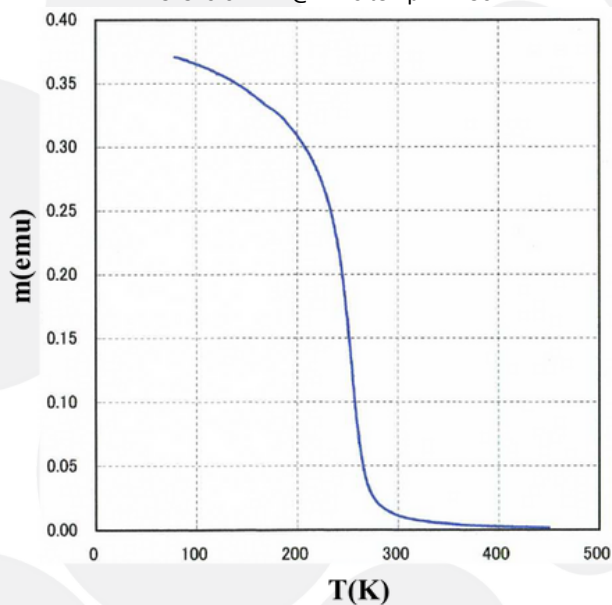
m vs temperature measurement



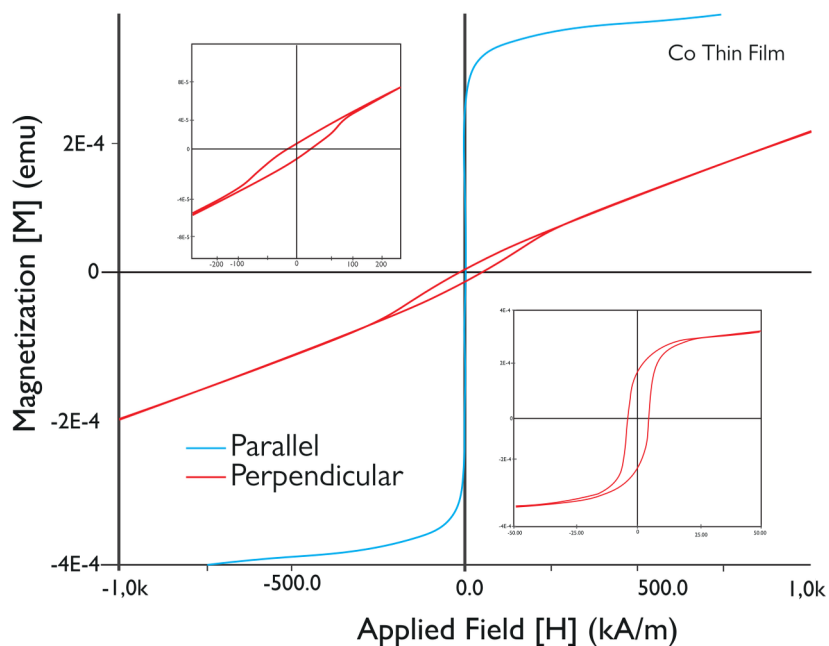
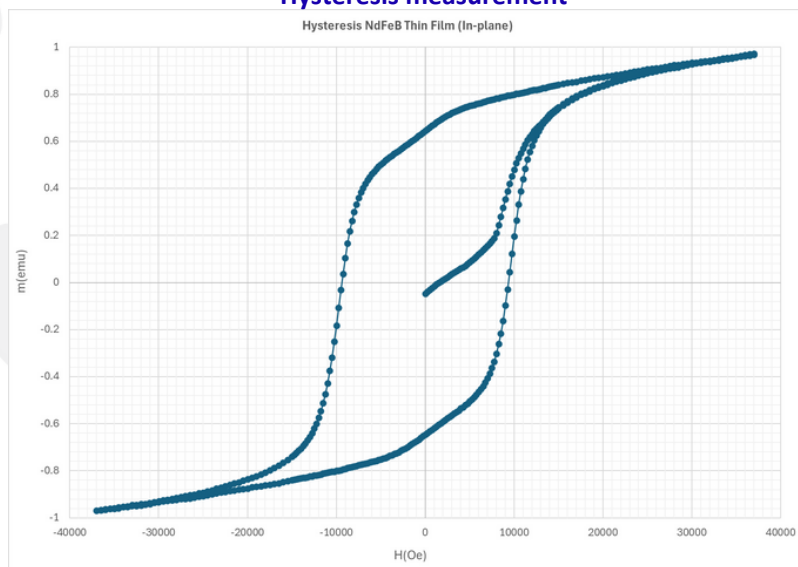
Hysteresis Measurement of Floppy disk 0.3mmx1mm @ 300K, H // Disk



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



Hysteresis measurement



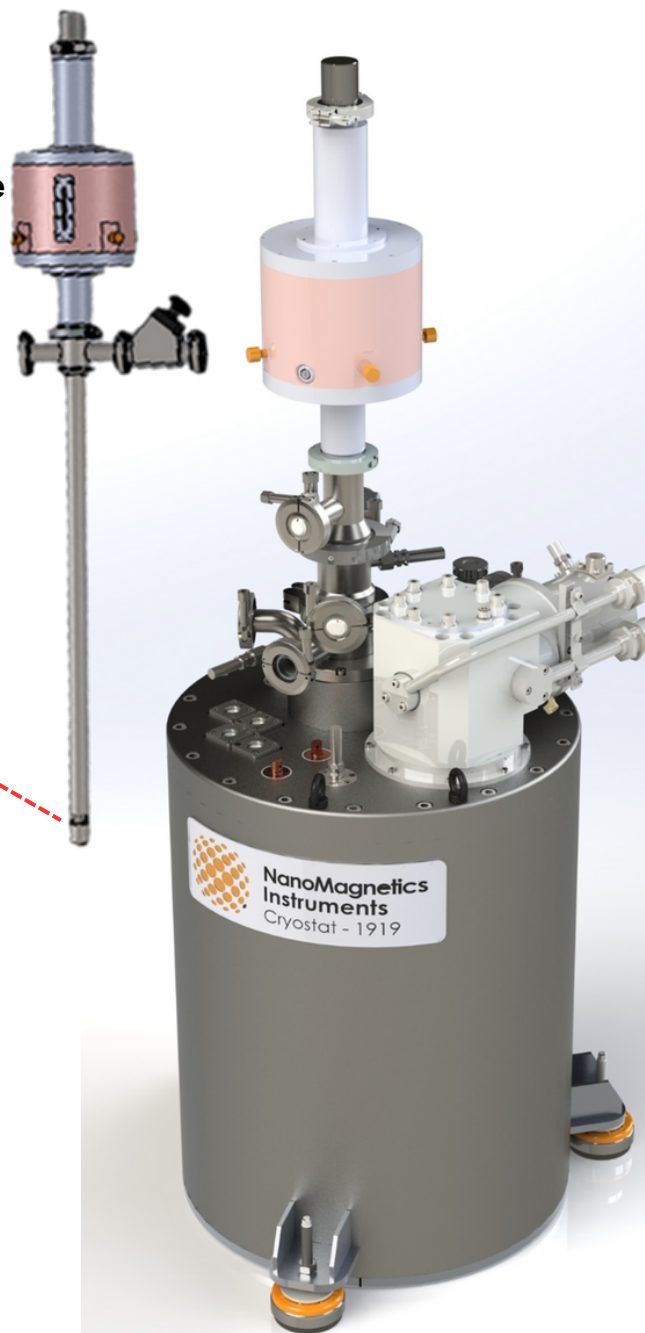
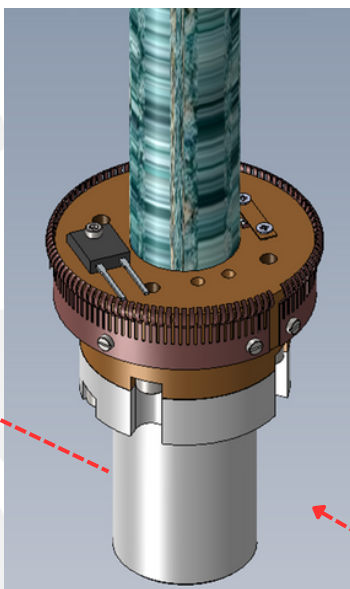
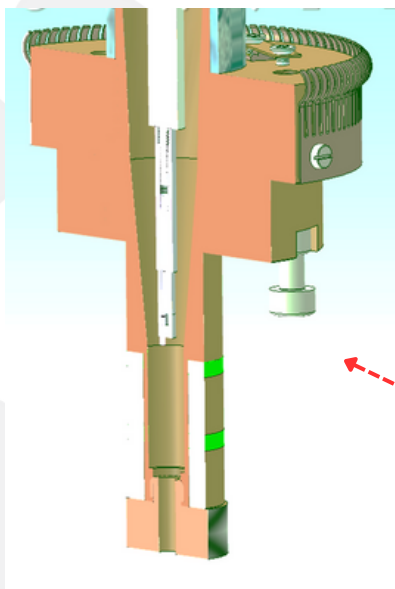
Co Thin Film





VSM with Closed Cycle Cryostat

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

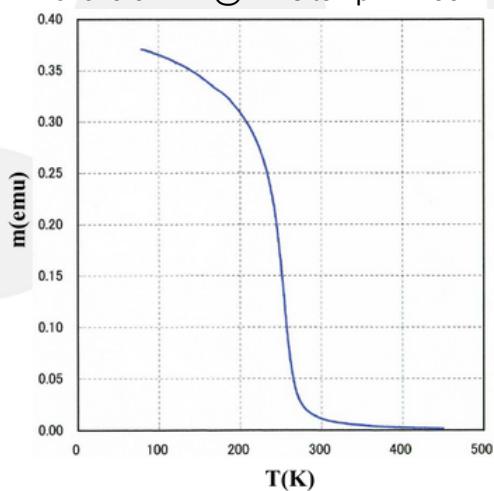


Automatically calculated parameters with analysis software:

- Coercive Field (H_c)
- Saturation Magnetization (M_s)
- Coercive Field (H_c) Offset
- Remanent Magnetization (M_r)
- Initial Slope ($dM/dH | H=0$)
- Nucleation field (H_n)
- Saturation field (H_s)
- Area enclosed by the hysteresis loop
- Slope at Coercive Field (H_c)

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

