Institute of Electrical Engineering SAS

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SC characterization at IEE Bratislava

IFAST WP9 Meet, Trieste, 18 April 2023

IEE OVERVIEW

2023 – Sample Batches investigated:

Deposition: *STFC Daresbury* Laser treatment: *Riga Technical Uni*

- Laser-treated **Nb** films on **Cu** substrates – *3.2.2023 series*

prepared at *STFC Daresbury:*

- **V_3Si** films on **Cu** and **Sapphire** substrates – *16.3.2023 series*

Lasered Nb/Cu samples

Table-summary

	Sample	Ben [Oe] (2% crit. at 4.22 K)		Tc [K]
		Perpend	Parallel	
Nb / Cu	0_Non_irr		240	9.25
	1_Atm_Laser_max		90	9.15
Arturs RTU	2_Atm_Laser_min		310	9.1
3.2.2023 series	3_Argon_Laser_max		-	7 ?
	4_Argon_Laser_min		-	7 ?

Results ~OK:

0 – non-irradiated

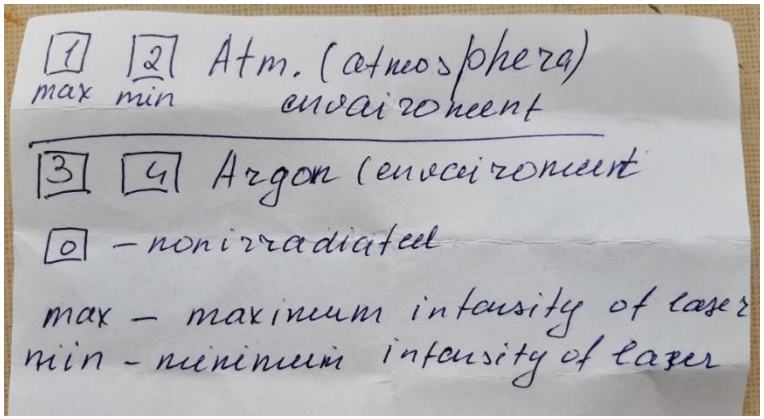
1 – irradiated in “Atmosphere”, Max intensity
(vacuum/low pressure? air??)

2 – irradiated in “Atmosphere”, min intensity
(vacuum/low pressure? air??)

Very poor:

3 – irradiated in Argon, Max intensity

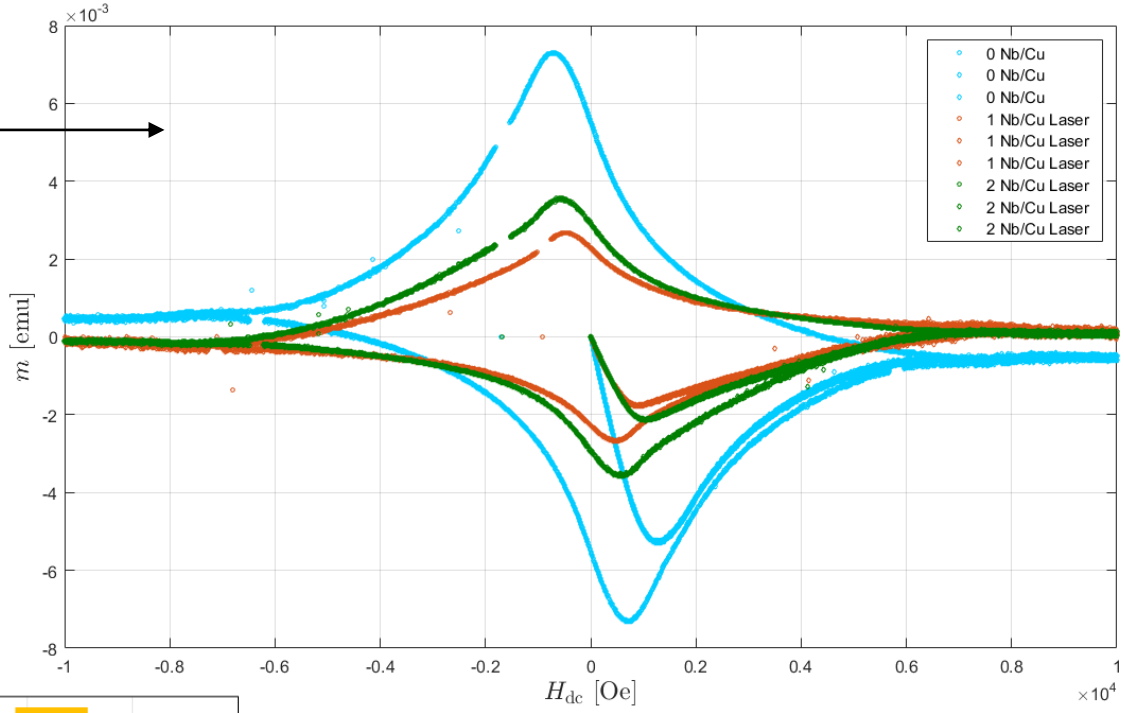
4 – irradiated in Argon, min intensity



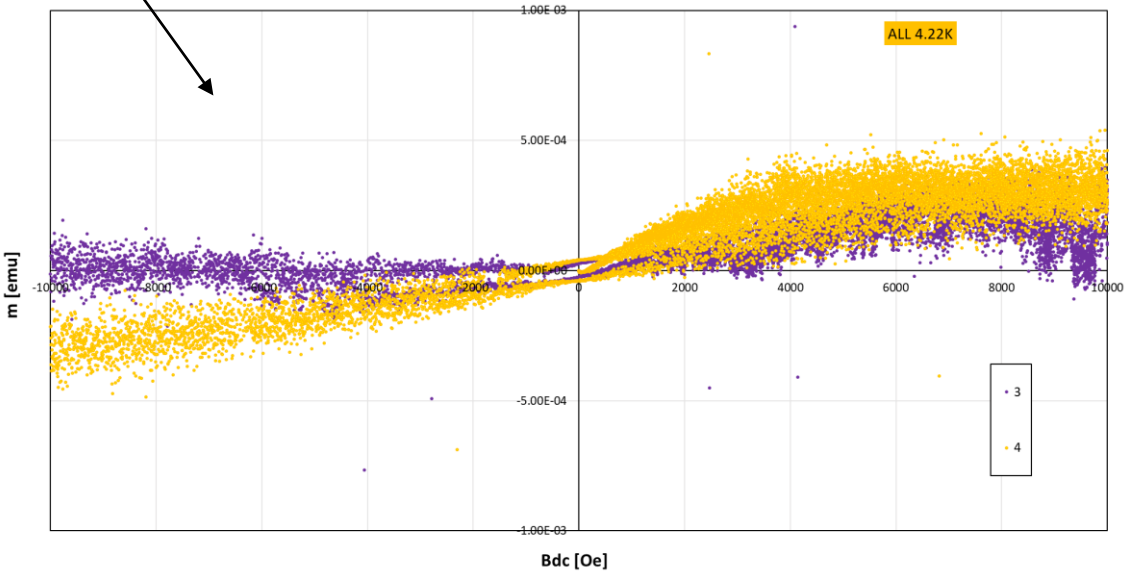
Sample info available at IEE

Mag Loops, as measured (4.2K)

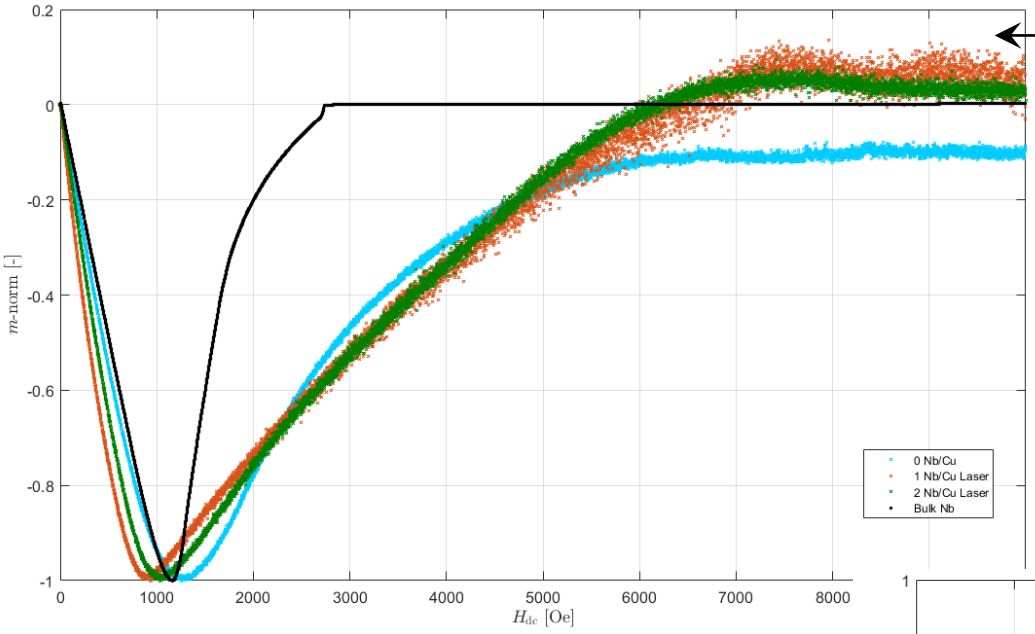
0 , 1 , 2



3 , 4



Normalised to Max

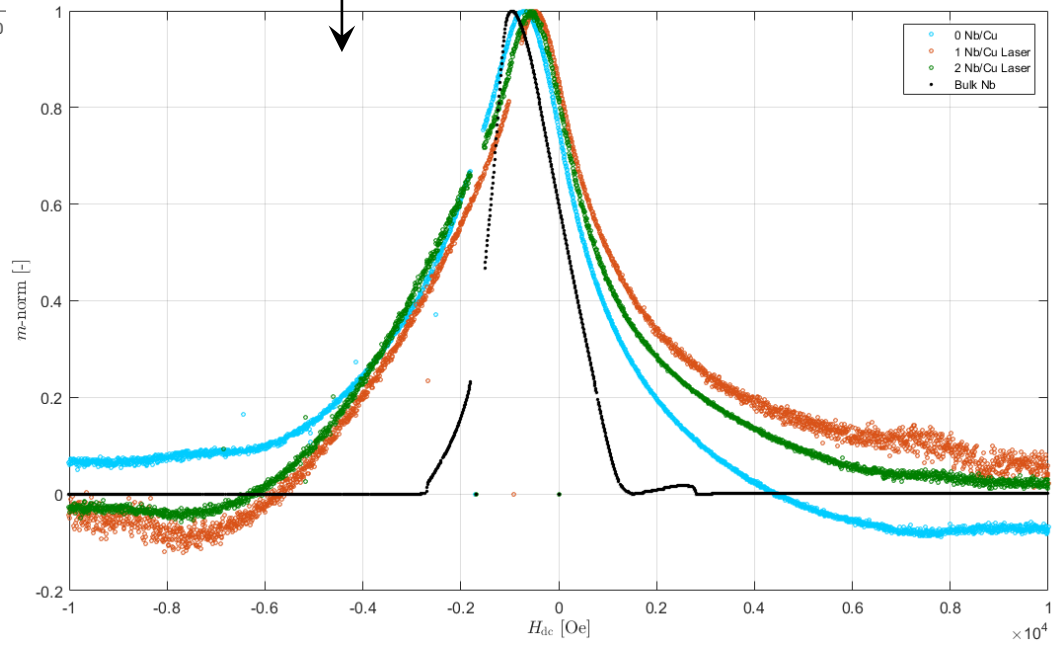


Virgin curves

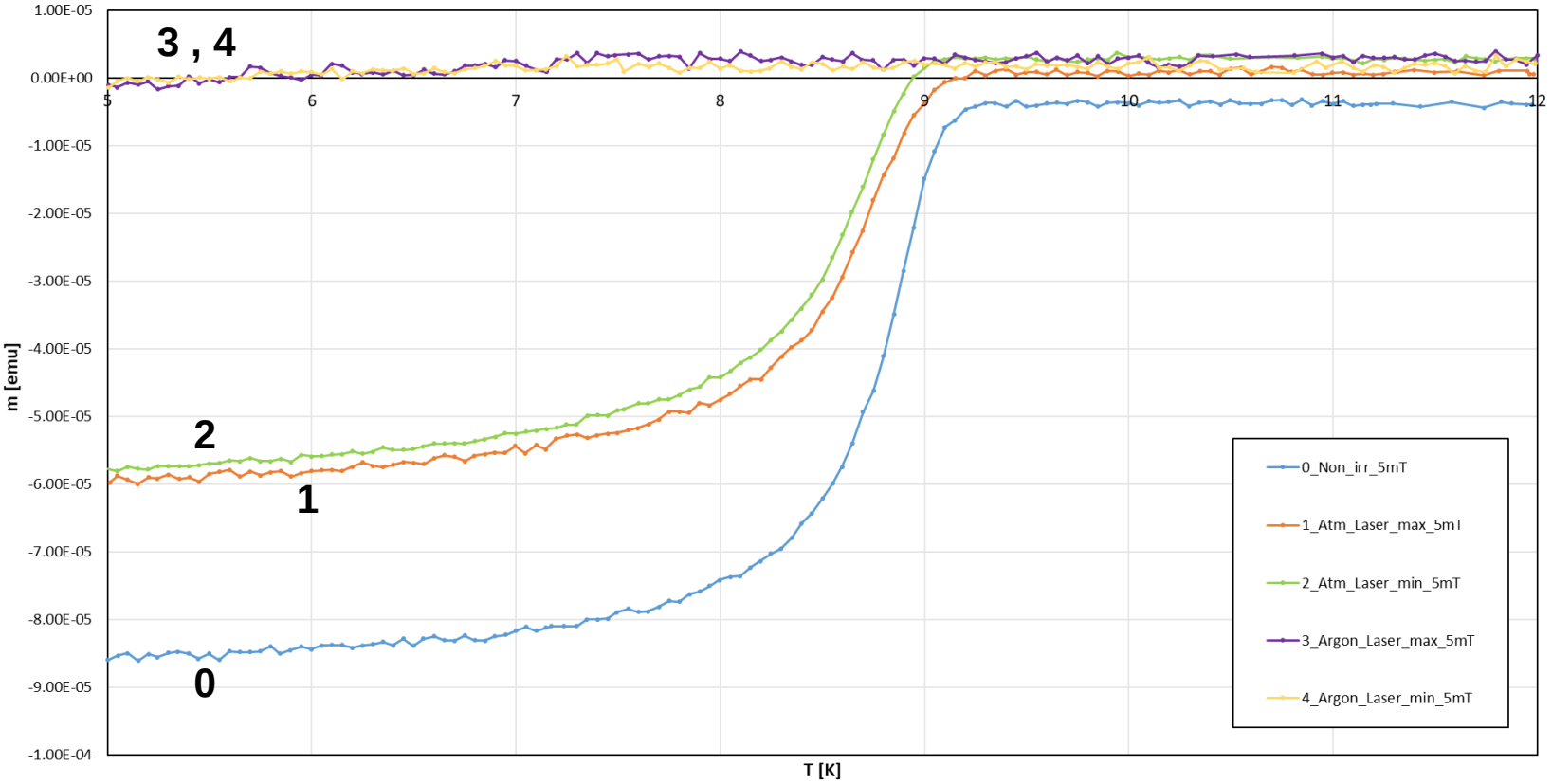
Upper loop branches

black symbols – Bulk Nb

0 , 1 , 2 samples

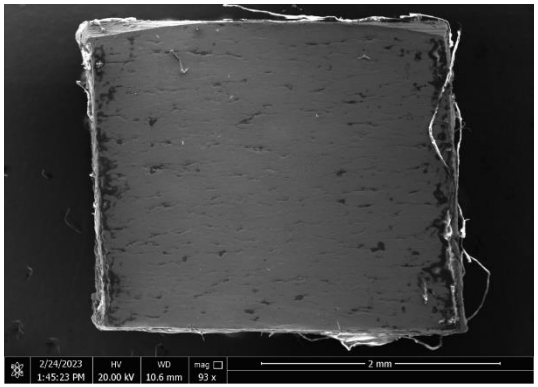


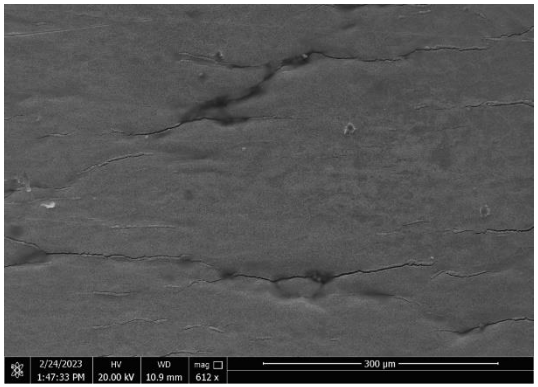
Temperature dependence $m(T)$

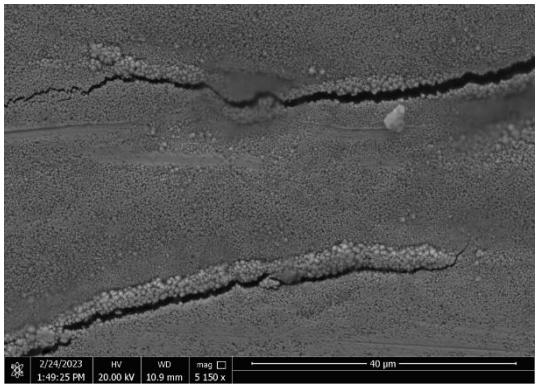


SEM micrographs

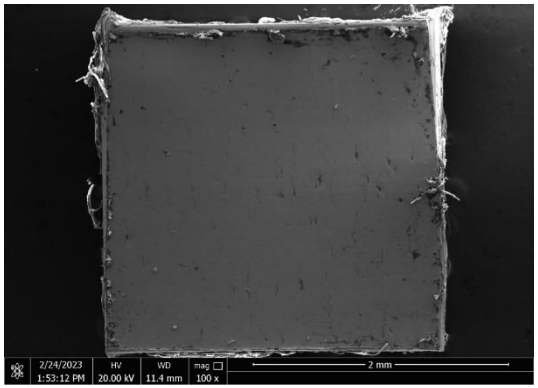
0 :

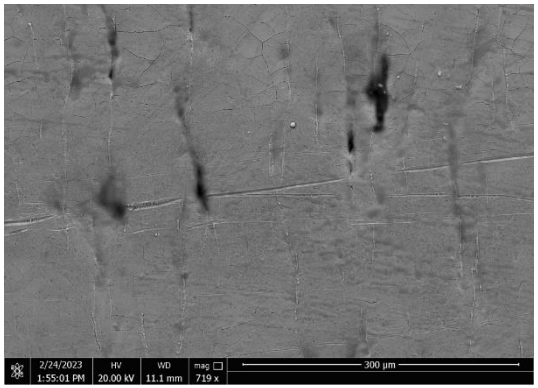


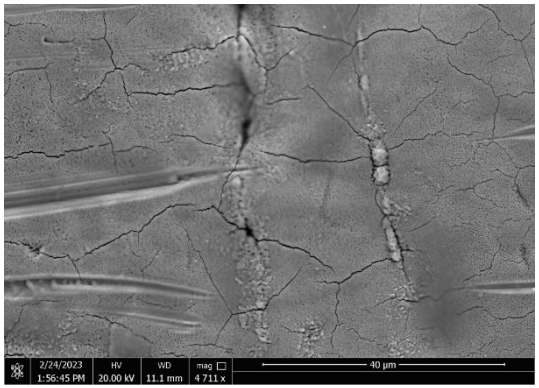




1 :







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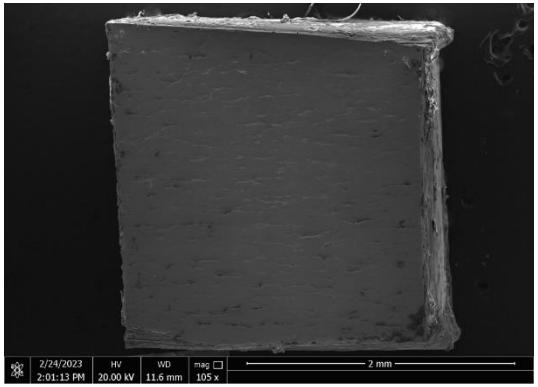

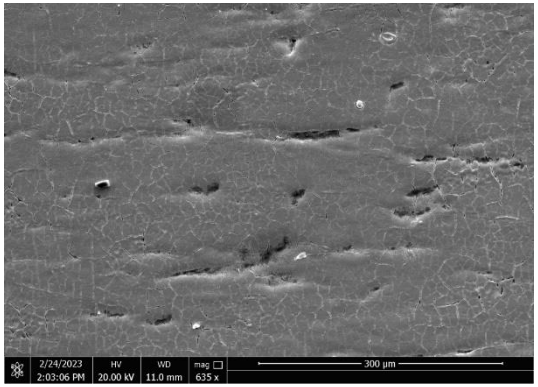

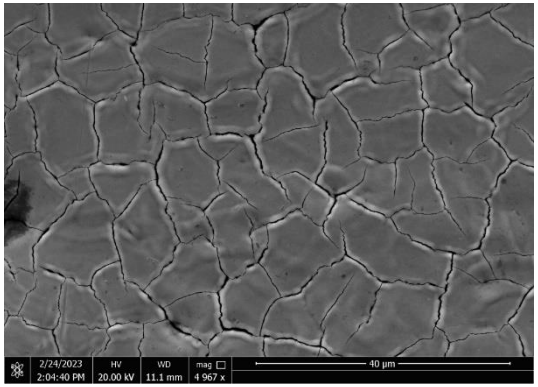

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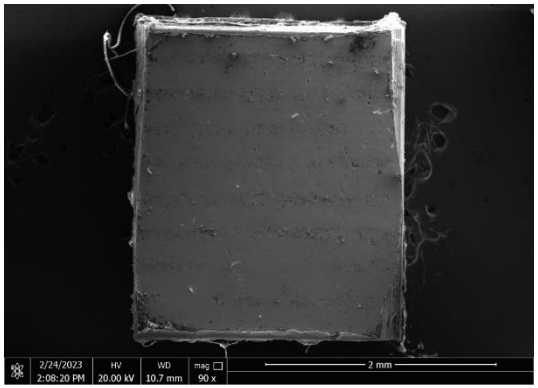
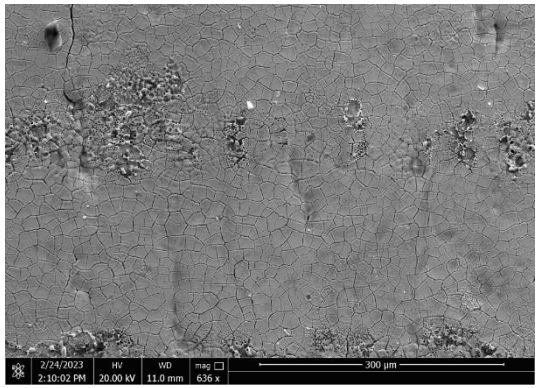
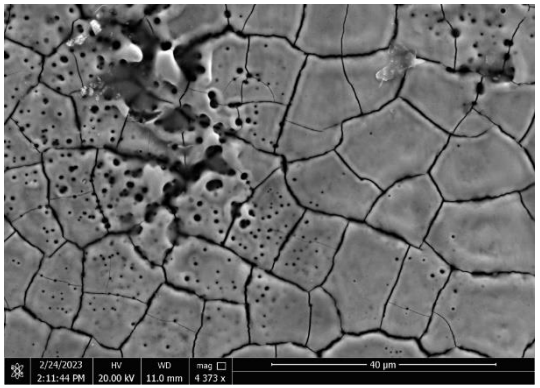
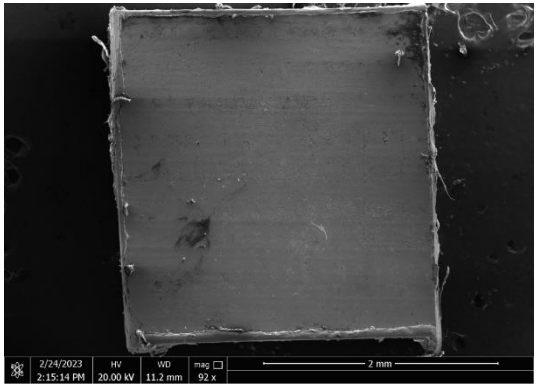
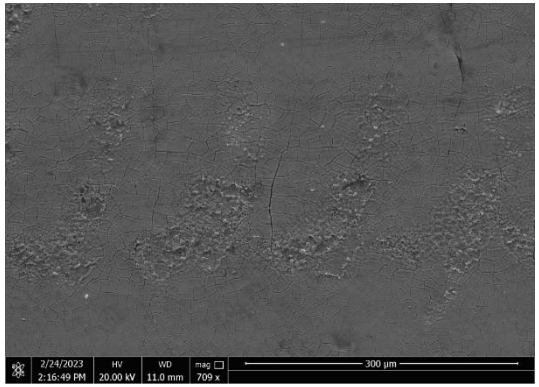


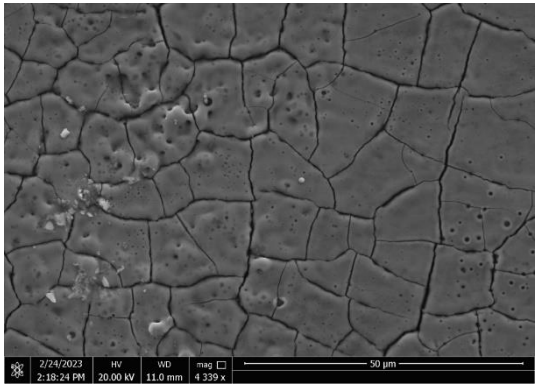




4 :







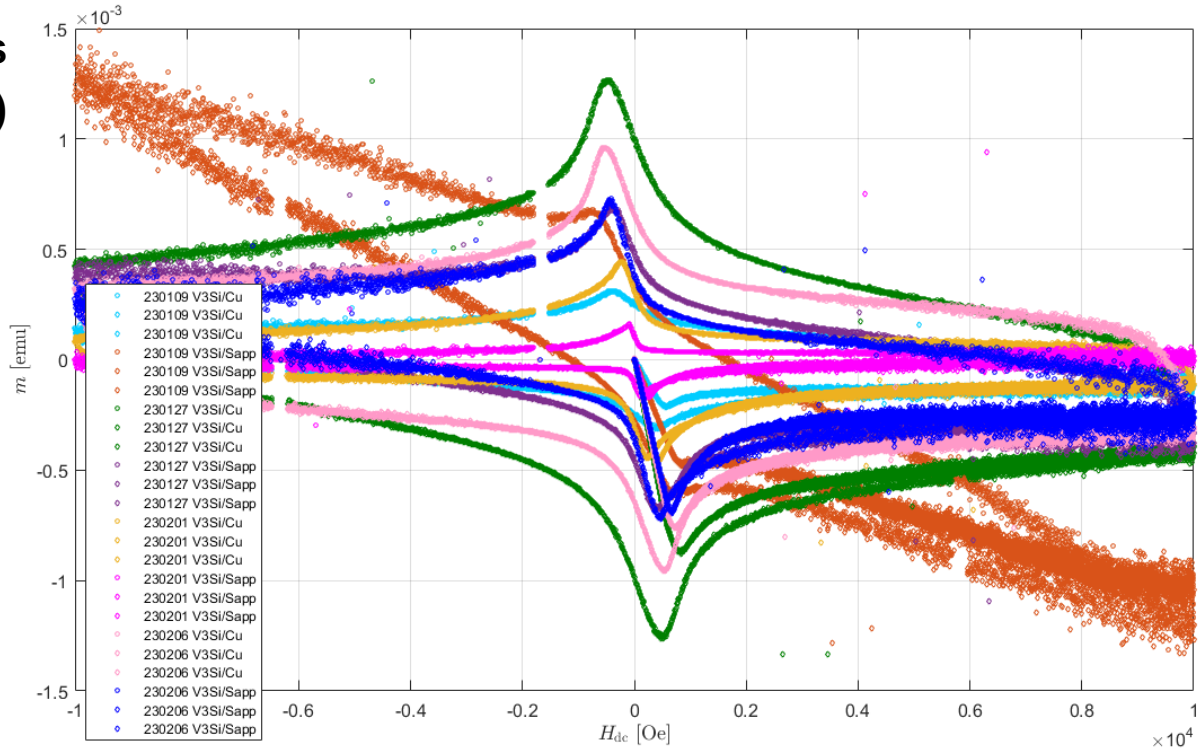
2 mm 300 µm 50 µm

V_3Si samples on Cu & Sapphire

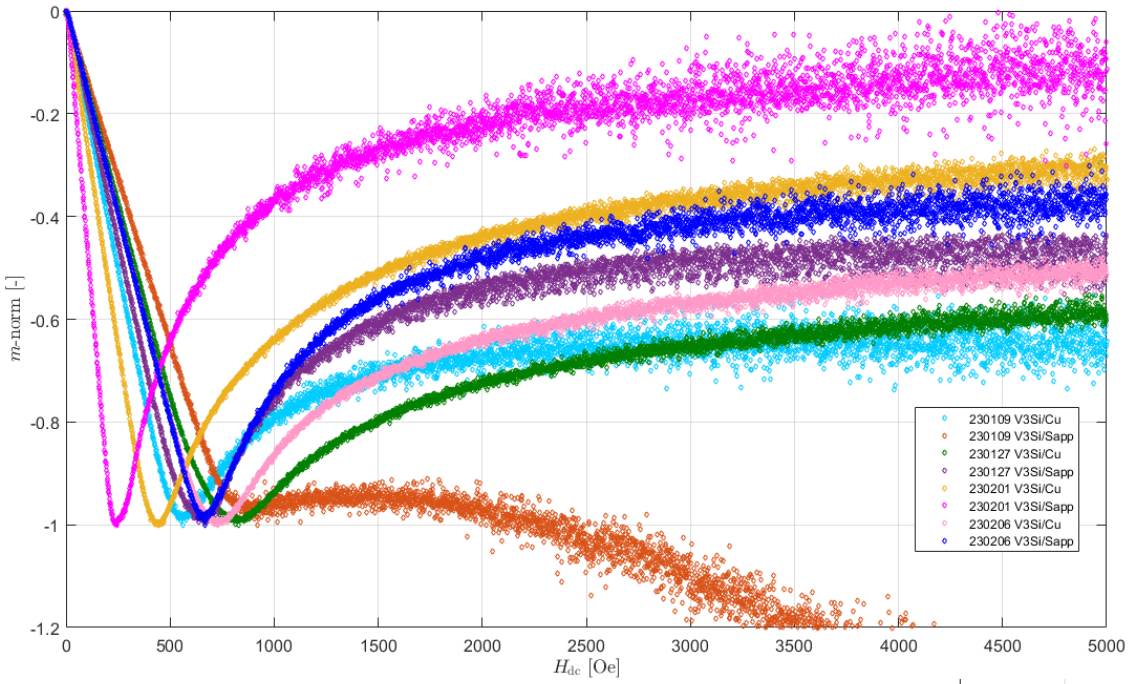
Summary

	Sample	Ben [Oe] (2% crit. at 4.22 K)		Tc [K]
		Perpend	Parallel	
V3Si	230109_Cu		190	12.8
Substrates: Cu, Sapphire	230109_Sapp		610	14
	230127_Cu		510	13
STFC	230127_Sapp		470	11.5
16-03-23	230201_Cu		330	10.5
	230201_Sapp		200	8.2
	230206_Cu		530	12.5
	230206_Sapp		580	11.5

All samples raw loops (4.2K)



Normalised curves

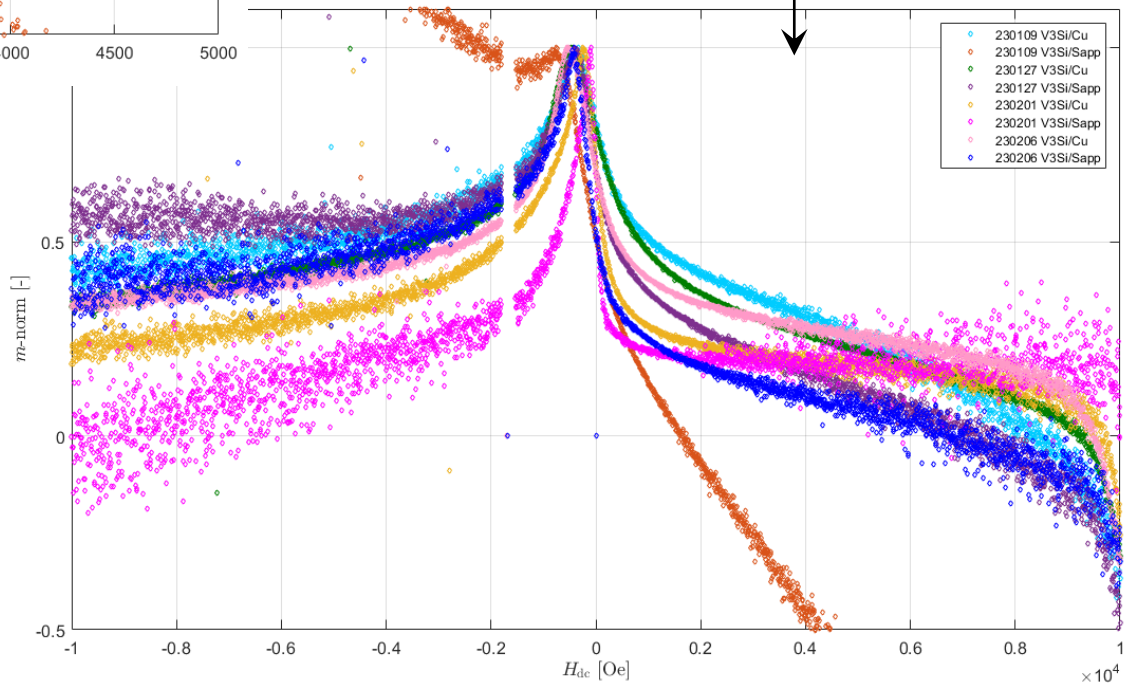


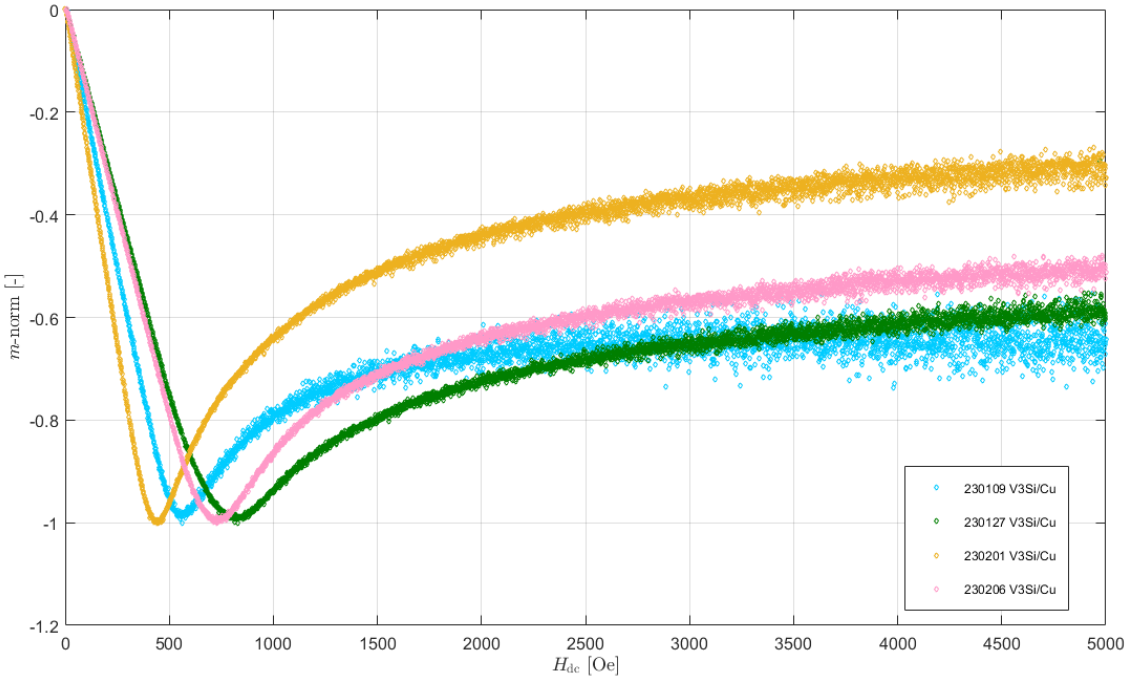
Virgin curves

Normalised to Max

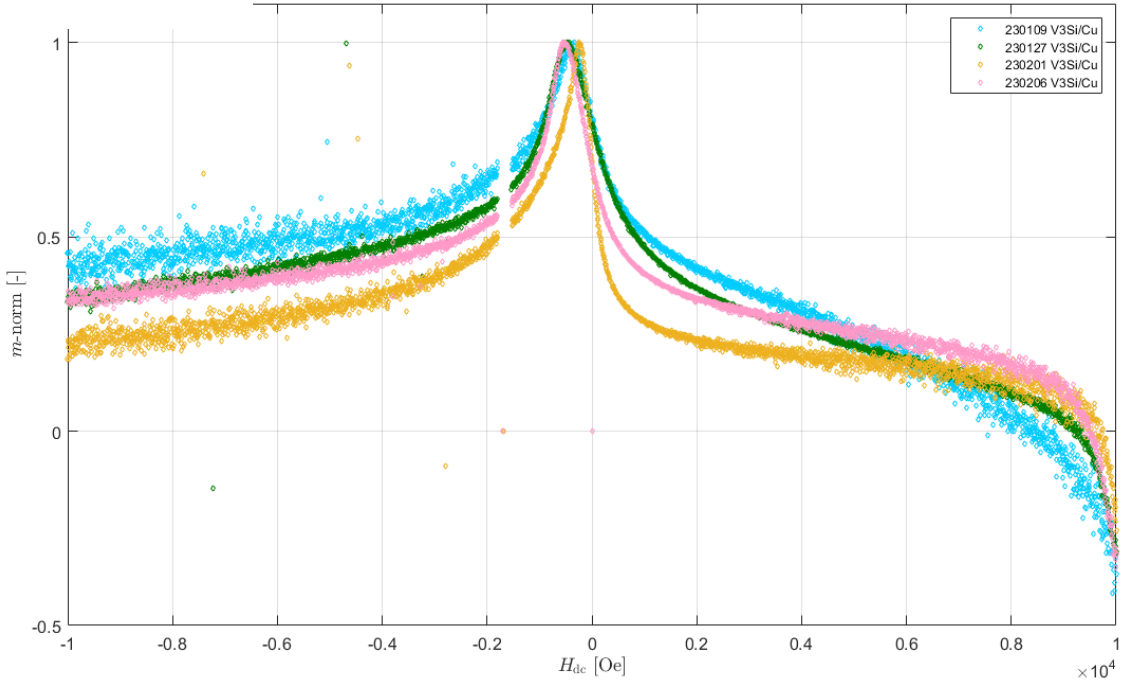
Upper loop branches

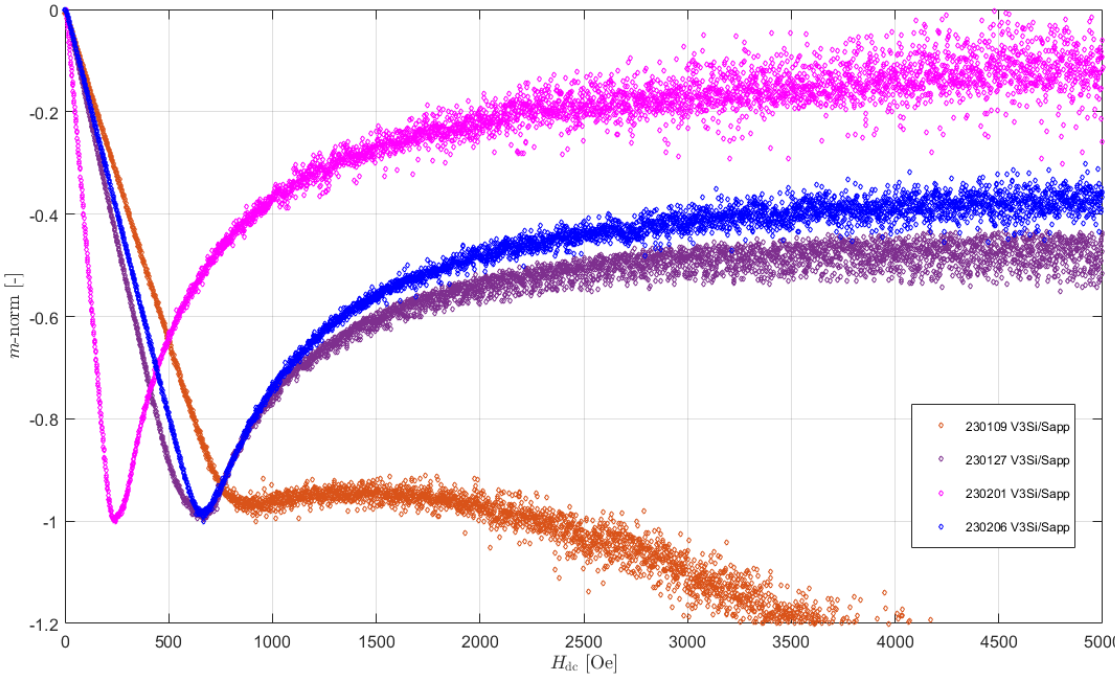
All samples



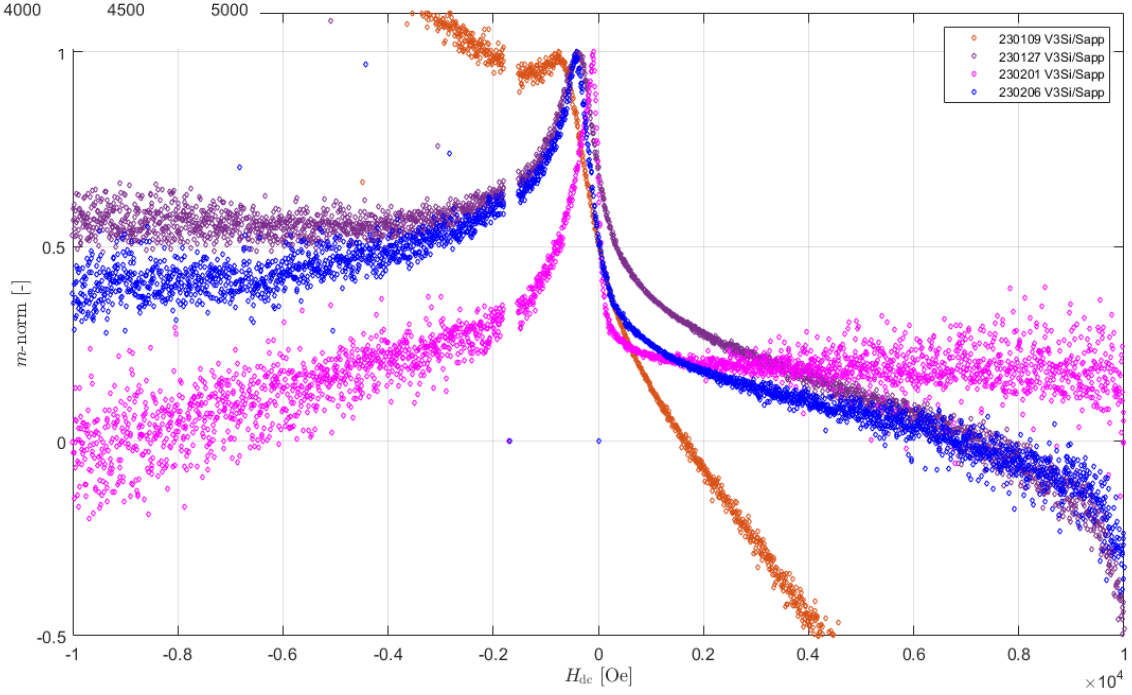


Cu substrates

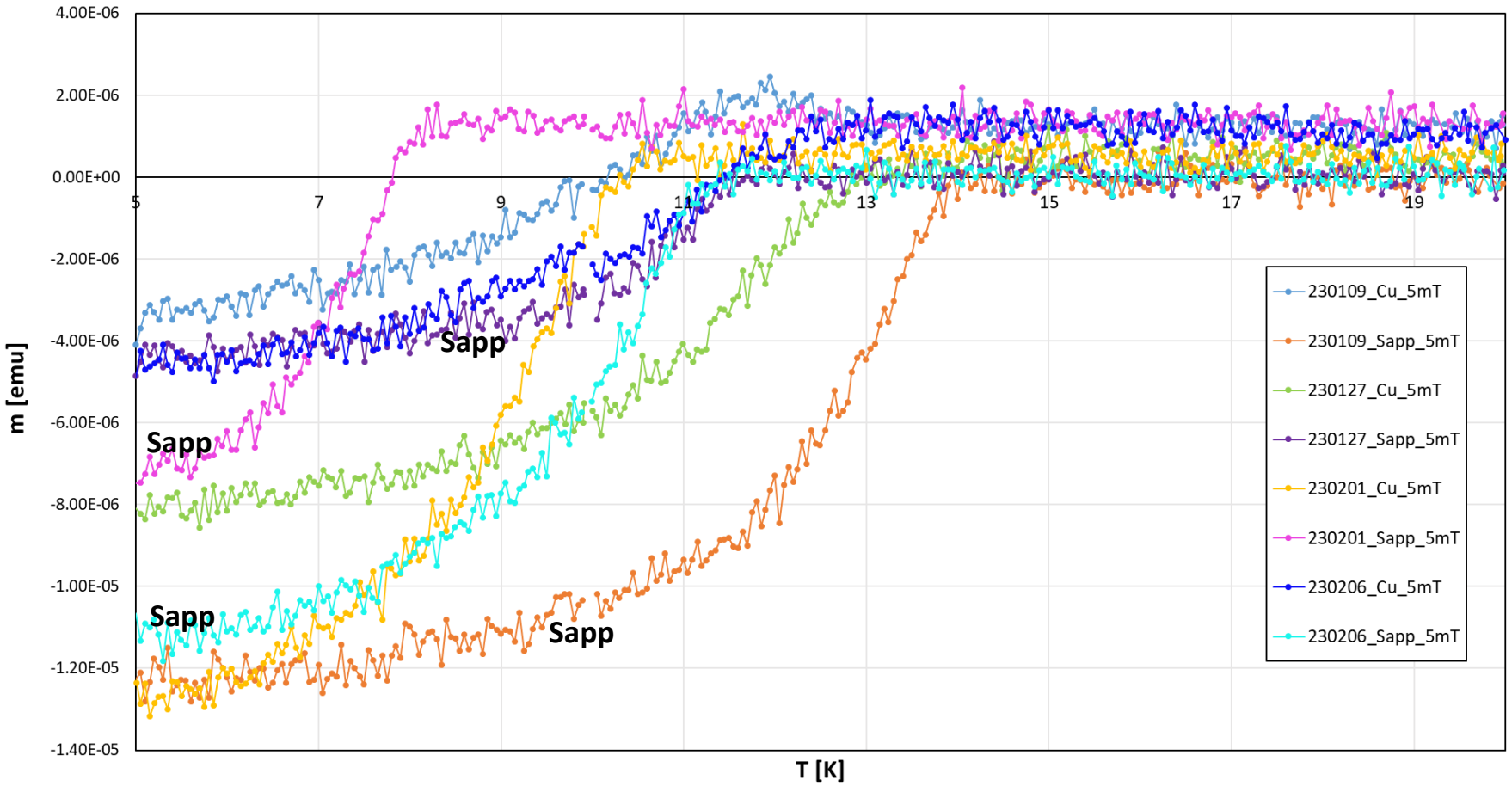




Sapphire substrates



Temperature dependence $m(T)$



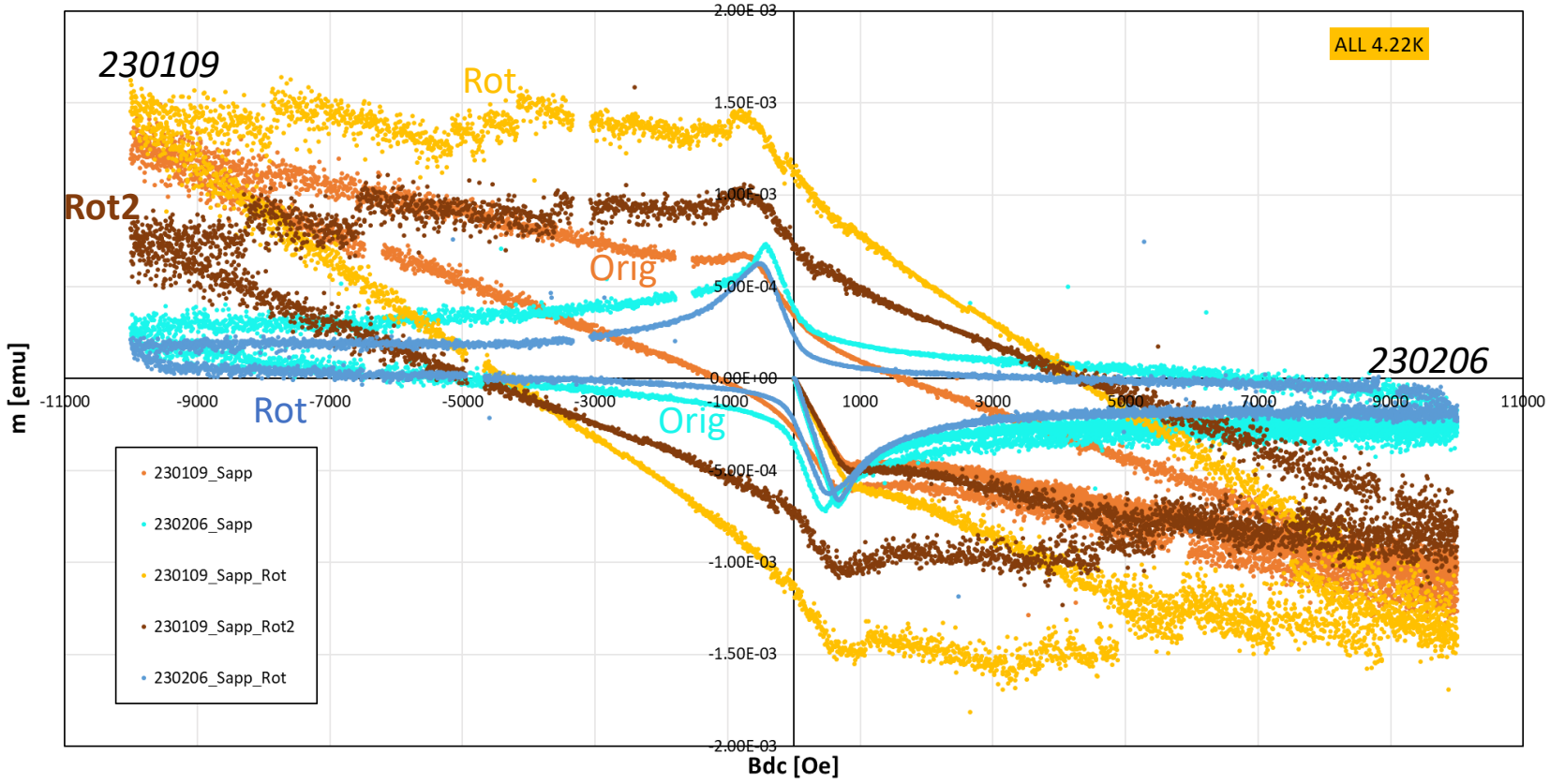
20K → 5K, 5mT applied field

Thanks for your attention

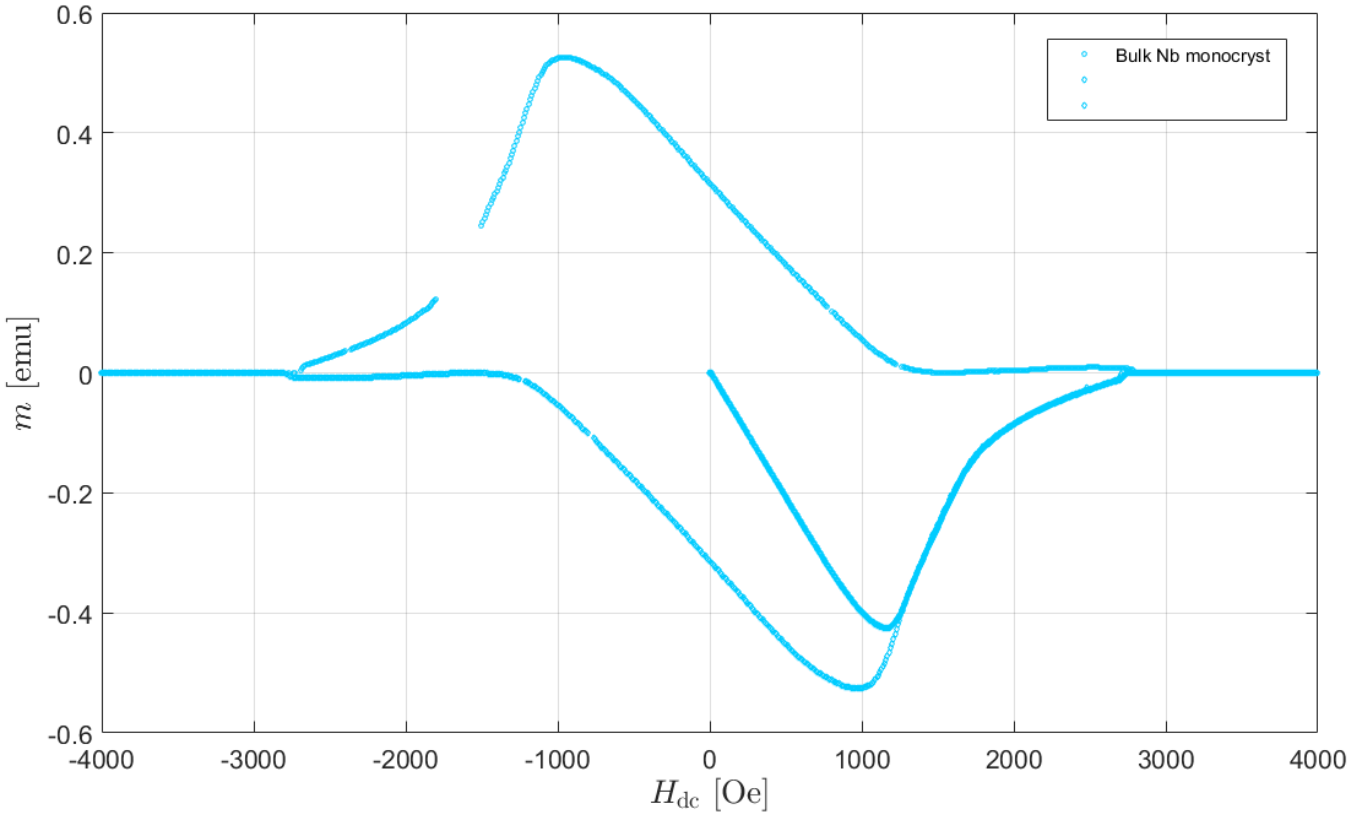
V_3Si

Sapphire substrates

Raw loops, Re-measured after sample rotation 90° (*230109*, *230206*)



Mag Loop – Bulk Nb monocrystalline, CEA



"raw" Loop (absolute *m*)

(at 4.2 K)