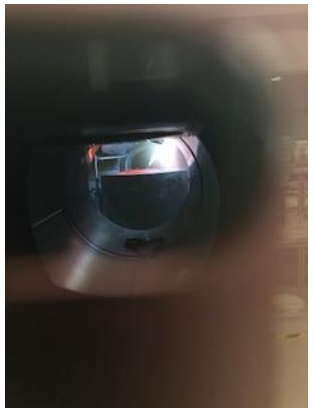
Science & Technology Facilities Council
ASTeC

ARIES

Progress report of SRF thin film deposition and characterisation at ASTeC

SRF Coating

In total four samples have been deposited during the last month.



- Nb/AlN/Nb3Sn on copper
- Nb3Sn on LNL EP copper
- Nb3SN on DL EP copper
- Nb/Nb3Sn on copper
- Nb/AlN/Nb3Sn on sapphire

in all cases the deposition temperature was kept at 650 C and the substrate was heated 18 hours prior to deposition.

Deposition Parameters

- Substrate heated 20 h prior deposition
- deposition temperature 650C

Deposition of Nb and Nb3Sn was done in DC mode

Deposition of AlN was done pulsed DC with 350 KHz and 1.1us duty cycle.

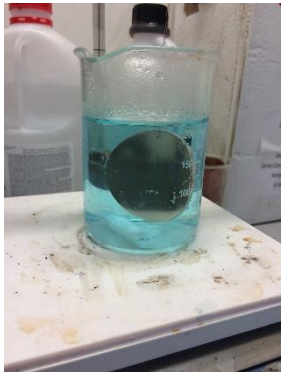
Deposition time: 4 h for Nb and 2h for Nb3N

Deposition SIS: 4 h for Nb, 10 min for AlN and 30 min for Nb3Sn

Deposition of Nb3Sn: 3 hours

Copper Surface Characterisation in SUBU electrolyte

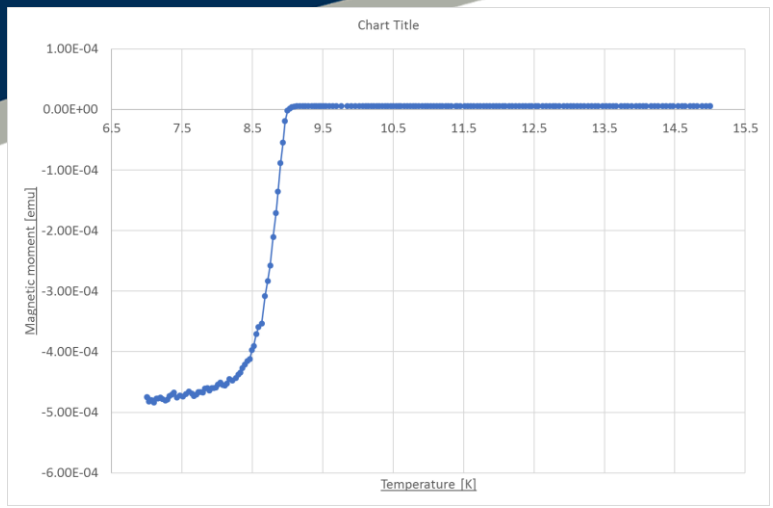
1. Degreasing: in NGL 1740 (surfactant from University of Manchester) bath for about 2 hours.
- 2. Activation: Sulfamic acid (H3NO3S, 5 g/l) for about 3 minutes in order to increase surface
- wettability and avoid bubbling formation at the surface.
- 3. Polishing: 40 minutes "SUBU5", SUBU5 = sulfamic acid (H3NO3S, 5 g/l), hydrogen peroxide (H2O2, 5% vol),
- n-butanol (5% vol) and ammonium citrate (1 g/l) at 72˚C (70-75˚C) with bath agitation.
- 4. Pre-rinsing with acid: Sulfamic acid (H3NO3S, 5 g/l) for about 1 minute, to remove hydrophobic layer.
- 5. Rinsing with water: demineralized water for about 30 seconds.
- 6. Spraying with alcohol: ethyl alcohol to enhance drying.
- 7. Drying with N2.
- 8. Packing in wafer box.



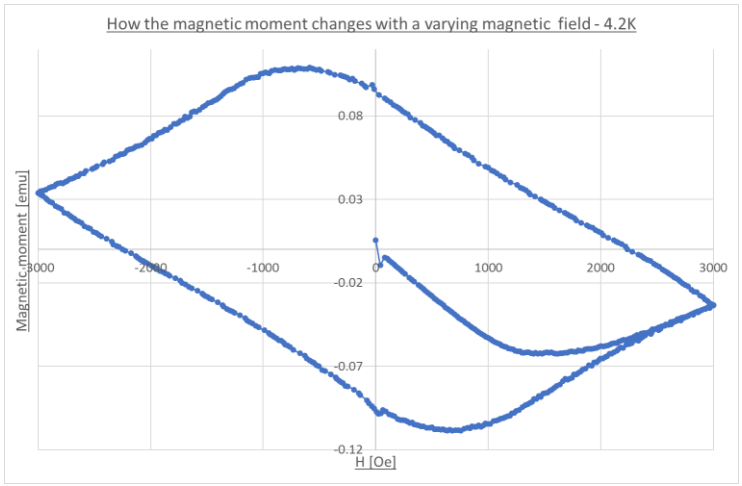
Electro polishing (EP) copper specimen

1. Electrolyte concentration H3PO4/(n) butanol (5:1)
2. Applied voltage 4-5 volt, Current density 1 A/cm2 in room temperature Time: 4 hours
3. Rinsing with water: demineralized water for about 30 seconds.
4. Spraying with alcohol: ethyl alcohol to enhance drying.
5. Drying with N2.
6. Packing in wafer box.

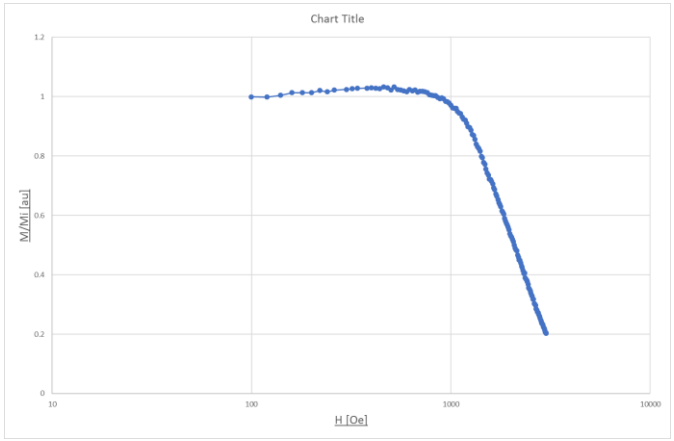
DC Squid for Nb on Ta



Transition phase in 100 Oe field



Hysteresis curve at 4.2 K



Initial magnetisation at 4.2k