

Introduction to the TCD lab facilities

Dr. Hilde Koch

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Different protocols for different labs

- Fission Track Lab
- Heavy Liquid Lab
- Magnetic Separator
- Unit 36b (Jaw Crusher, TEMA, Anvil)

- LA-ICP-MS Lab (Geochronology)
- SEM
- LA-ICP-MS Lab (Sulphides)
- Clean Lab

Museum Building



Fission Track Lab, Heavy Liquid Lab and Magnetic Separator

PI – Fission Track Lab and Heavy Liquid Lab - Prof David Chew (chewd@tcd.ie)

PI – Magnetic Separator – Dr. Quentin Crowley (crowleyq@tcd.ie)

Dedicated Postdoc - Dr. Hilde Koch (hilde.anna@ucd.ie)

Contact

- Email PI, cc Hilde

Equipment

- Frantz LB-1 magnetic separator
- Mineral Separation
 - Diiodomethane or Methylene Iodide (MI)
 - Sodium-polytungstate
- Picking of mineral grains using a Nikon SMZ 1500 binocular
- Preparation of epoxy resin discs
- Semi-automatic polisher for pucks using a diamond grit first (c. 10 μm), followed by 6 μm and 1 μm polishing paste



Museum Building



Fission Track Lab, Heavy Liquid Lab and Magnetic Separator

Training

- Responsibility of respective PI
 - Often devolved to competent and experienced postdocs or senior postgrads

Access

- Google calendar
 - Once training is completed, the user gets a unique access link for bookings – does not apply to undergrads
- Same lab can only be booked for two days per week → sustains a fair usage of labs
 - If lab is not busy and there is no booking for the following day, you can book labs more than twice a week
- Frequent users get a key for respective lab
- Use provided sign-in sheet

TTEC (Trinity Technology and Enterprise Campus) — Grand Canal Dock



Unit 36b

Robbie Goodhue

Dedicated Postdoc (Dr. Hilde Koch; hilde.anna@ucd.ie)

Contact

- Either Robbie or myself

Equipment

- Jaw crusher (tungsten carbide)
- Disc mill / TEMA (tungsten carbide and agate)
- Anvil and Hammer
- Sieves
- Pan
- Oven

Ball mill and shaking table are currently broken



Unit 36b

Unit 36b

Training

- Responsibility of your PI
 - Often devolved to experienced postdocs or senior postgrads

Access

- Google calendar
 - Once training is completed, the user gets a unique access link – does not apply to undergrads
- Same lab can only be booked for two days per week → sustains a fair usage of labs
 - If lab is not busy and there is no booking for the following day, you can book labs more than twice a week
- Use provided log-book
- Key is with Sarah Carty (sacarty@tcd.ie) and Clara Siqueira (decastrc@tcd.ie) in the ESRL (Unit 6)
 - When signing in the google calendar, check first if either of them are there
- Working hours are between 9 am to 5 pm



Unit 6

Unit 36b

Consumables

- Are provided
- Charged every 3 months based on the calendar booking

Task	Consumables	Daily rate (10.12.21)
Picking	alcohol, wipes, tweezer; (having own tweezer is recommended)	5 €
Mounting	Resin, hardener	5 €
Polishing	polishing fluid, polishing plates, alcohol, wipes, gloves	20 €
Magnetic Separator	Sample bags	3 €
Mineral Separation	alcohol, acetone, wipes, gloves, heavy liquid, glassware	20 €
Jaw Crusher	alcohol, wipes, sample bags	5 €
TEMA	alcohol, wipes, sample bags	5 €
Ball Mill	alcohol, wipes, sample bags	5 €
Hammer & Anvil	alcohol, wipes, sample bags	5 €



Common Lab Practice

- Book yourself into google calendar
- Use provided sign-in sheet
- Wipe surface after you have completed your work
- Return consumables to dedicated place
- Get new consumables from technicians BEFORE you empty it
- Bring back materials that can be reused, e.g. glass plates, ...
- Report broken equipment IMMEDIATELY to PI of equipment and to me

Clean Lab / Solution ICP-MS

Lab Manager (Prof David Chew, chewd@tcd.ie)

Dedicated Staff: Cora McKenna; mckennc6@tcd.ie)

Contact

- Email Dave, cc Cora

Costs

- REE and selected trace elements of silicates
 - 120€ / sample for HF-HNO₃ digestion on hotplate
 - 200€ / sample for high pressure/bomb digestion
- REE and selected trace elements of carbonates
 - 80€ / sample for HNO₃ leachates
- Selected trace elements of fresh water samples
 - 80€ / sample

Unit 7





Solution ICP-MS

Good to know

- One batch includes 20 unknown samples (+ standards and blanks)
- Analysis of one sample batch can take between 2 to 3 months
- Materials not to be analysed
 - sulphides
 - Synthetically made samples, e.g. where trace elements are in major concentrations
 - Samples prepared with tungsten carbide (agate milling only!)
 - Sea water / samples with high salt content

Thermo Fisher Scientific, iCAP-Qc Quadrupole Mass Spectrometer

LA-ICP-MS Lab (Sulphide Samples)

Teledyne Technologies Photon Machines G2-193nm Excimer Argon-Fluorine Laser
Thermo Fisher Scientific, iCAP-Qc Quadrupole Mass Spectrometer

Lab Manager - Dr. Sean Mc Clenaghan (mcclens@tcd.ie)

Manager for iCRAG work - Dr. Emma Tomlinson (tomlinsone@tcd.ie)

Dedicated Postdoc - Dr. Maurice Brodbeck (brodbecm@tcd.ie)

Contact


- Email respective Lab manager, cc Maurice

Costs

- iCRAG: 350 € / day
- Others: 450 € / day

Unit 7





LA-ICP-MS Lab (Sulphide Samples)

Preparation

- Scanned thin sections or SEM images with location or area of interest indicated on the image
- Knowledge of major element composition of phase of interest for internal standardization

Analyses

- 150 spot analyses
- 2-3 maps per day, depending on size and parameters (takes approximately 1h to map 1mm²)

Solution Optical Emission Spectroscopy - OES

Lab Manager - Dr. Emma Tomlinson (tomlinsone@tcd.ie)

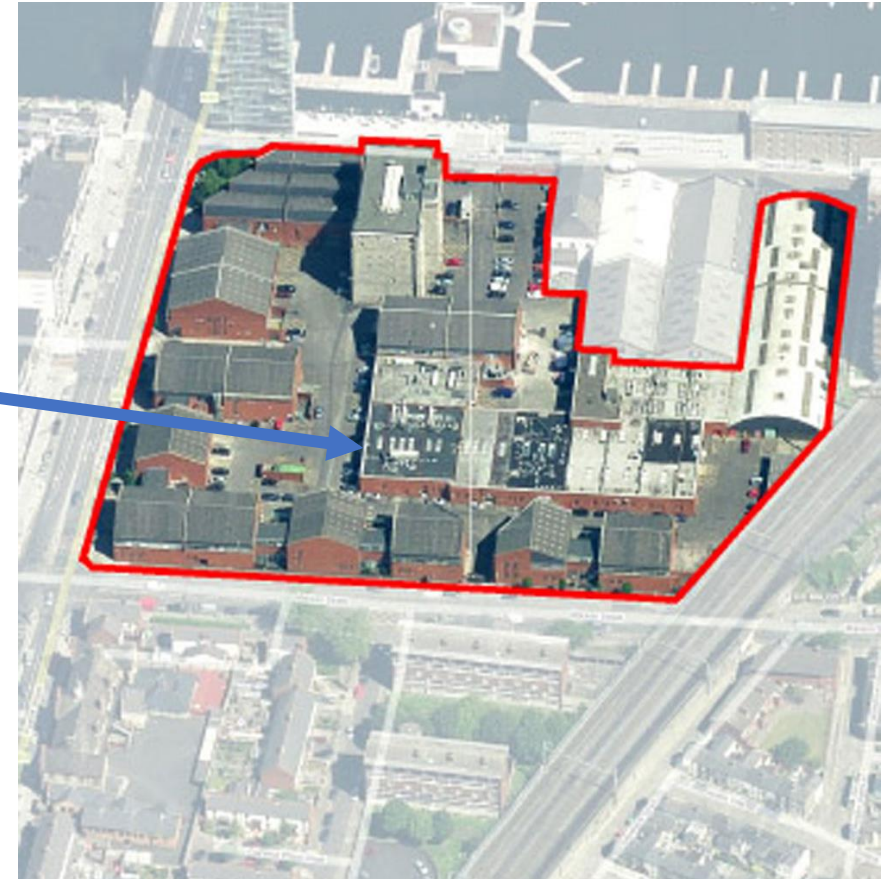
Costs

- 4€ / sample
- Minimum amount charged: 100€ / day

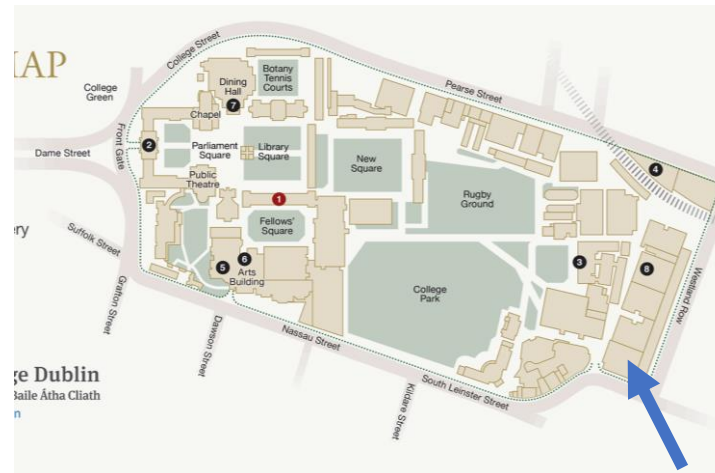
Analyses

- Maximum 80 samples / day

Unit 7



iCRAG Lab / CMA



Virtual lab tour available on:
<https://www.tcd.ie/Geology/cma/index.php>



LA-ICP-MS Geochronology

Teledyne Technologies Photon Machines G2-193nm Excimer Argon-Fluorine Laser
Agilent 7900 Mass Spectrometer

Lab Manager: Prof David Chew (chewd@tcd.ie)

Dedicated Staff: Foteini Drakou (drakouf@tcd.ie)

Contact

- Email Dave

Costs

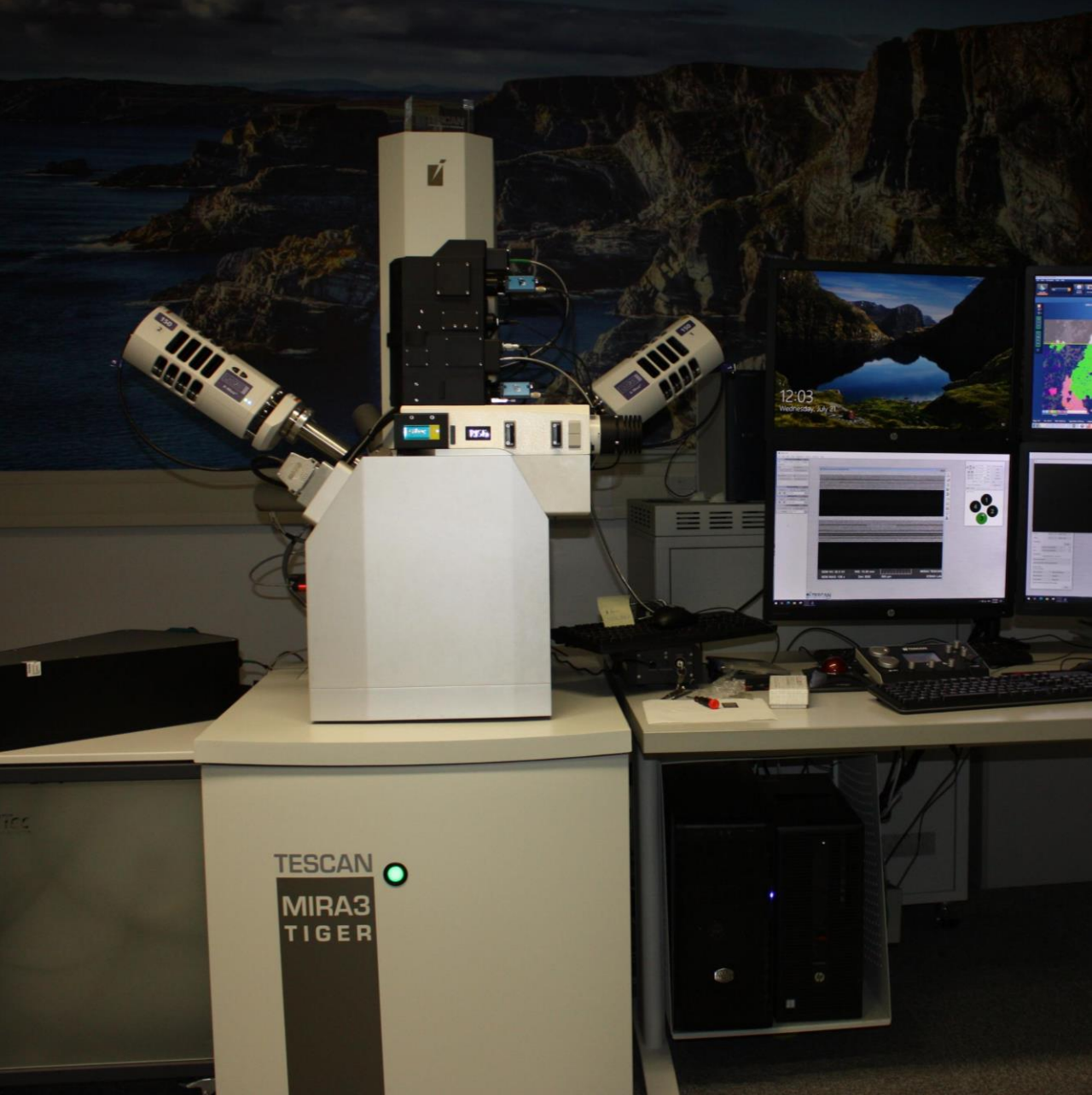
- iCRAG: 350 € / day
- Others: 450 € / day

Preparation

- Scanned puck with location of grains or area of interest indicated on image

Analyses

- 300 spot analyses



Tescan Tiger MIRA3 FEG-SEM

Contact

Dr. Paul Guyett (pguyett@tcd.ie)

Cost

- €320 per day
- PI's can purchase Gold, Silver or Bronze memberships for multiple day access.

Detectors and Features

- Motorised backscatter electron detector
- Colour cathodoluminescence detector
- Two Oxford Instruments X-Max 150 mm² detectors
- Oxford AZtec capable of spot analysis, EDX mapping and Feature analysis.
- WITec RISE Raman system



Tescan S8000 FEG-SEM

Contact

Dr. Paul Guyett (pguyett@tcd.ie)

Cost

- €320 per day
- PI's can purchase Gold, Silver or Bronze memberships for multiple day access.

Detectors and Features

- Motorised backscatter electron detector
- Colour cathodoluminescence detector
- Four Oxford Instruments X-Max 170 mm² detectors
- Oxford AZtec capable of Aztec Live, spot analysis, EDX mapping and Feature analysis
- Oxford Instruments Symmetry EBSD detector (Currently not available for use)



Sample Preparation

- Non-conductive samples need to be coated before SEM analysis.
- Gold coating for samples that need super clear imaging.
Cost is €30 per sample.
- Carbon coating for EDX analysis.
Cost is currently free.
- Samples include
 - flat polished thin sections (no more than 2.7cm wide and 7.5cm long)
 - or polished resin mounts no more than 2.5 cm in diameter.



Profilm 3D White Light Interferometry

Contact

Leona O'Connor (mulvey@tcd.ie)

Cost

- €80 per hour



Nikon Optical Microscope

Contact

Dr. Paul Guyett (pguyett@tcd.ie)

Cost

- Currently free

Features

- Two Nikon Optical Microscopes both fitted with NIKON DS-Ri2 cameras.
- Fully automated motorized stage allowing for large stitched images.
- Fully automated motorized z-stacking allowing imaging of samples with varying height.

Thanks for your Attention!