Health and Safety Information for Rankine Building Rooms 119, 120, 121, 123 and 223A

Code of Practice, Risk Assessments and Potential Hazards

Levels 1 and 2, Rankine Building,
James Watt School of Engineering, University of Glasgow

Undertaken by Prof Douglas J Paul, 16th June 2020

1. Code of Practice

The adoption and practice of good safety procedures is of paramount importance for both the health and safety of fellow workers, and for the integrity of the fabric of the Semiconductor Device Group laboratories.

2. Lab Safety Management Responsibilities

1. Everyone has a role in protecting the health and of safety of other lab users and themselves, and should thus be familiar with the School Safety Manual (https://www.gla.ac.uk/schools/engineering/informationforstaff/safety/).
2. Academic supervisors take full responsibility for the health and safety of the research group's activities and consequently must ensure that staff, students and visitors are familiar with the content of this Code of Practice and Risk Assessments plus the School Safety Manual and apply its requirements.
3. No research activities shall be carried out in the Rankine building laboratories 119, 120, 121, 123 and the quantum technology section of room 223A without the permission of Douglas Paul, the Lab Guardian.
4. No work will be carried out unless it is covered by the Risk Assessment (Section B) on this form. New activities should be discussed with the supervisor, lab guardian and School Director of Safety. Section B should be updated accordingly after approval.
5. An electronic copy of the current Code of Practice and Risk Assessment shall be sent to the Lab Responsible Person and shared with the School Director of Safety. A printed copy of the current Code of Practice and Risk Assessment, signed and dated (electronically of physically) by all current users (Section C) will be displayed in room 123.
6. All lab users must familiarize themselves with the general safety procedures highlighted in the School's Safety Manual and location of safety equipment in the lab. In summary:
   - In case of emergency, dial telephone number 4444 (internal), 0141 330 4444 (external).
   - To exit the Rankine building use the main stairwells (not either lift). There are emergency exits on levels 2, 3 and 4 to the back of the Rankine Building.
   - Fire Extinguishers are located in the main stairwells and corridors on levels 1 and 2.
   - First Aid Kits are available in lab 123 and in the janitors office on level 4.
7. Work outside of normal office hours (8 am-5 pm) and weekend working requires permission of your supervisor. The out of hours working book located in the lobby of the Rankine building must be signed, noting the name of the individual, location, time in and time out. Potentially dangerous operations must never be undertaken outwith normal hours unless a second responsible person is present (please refer to the School's safety Manual).
8. Guidance for health and safety for any users that are pregnant can be found at https://www.gla.ac.uk/schools/engineering/informationforstaff/safety/

3. Best practice in the laboratory

1. The lab must be kept tidy.

2. No food and drink will be brought into any of the laboratories.
3. Safety equipment provided will be used appropriately.
4. First aid boxes are available next to the sink in room 123. All users should be aware of the qualified building first aiders (notices with their names and contact details are beside the lift entrances at each level).
5. Use equipment in accordance with the instructions from the manufacturer.
6. Inventories of key equipment requiring specific consideration for safe use and specific laboratory procedures are detailed in the Appendixes below.
7. Avoid trailing cables and fibres across the laboratory.
8. Consider your own safety and that of other laboratory users when operating lasers.
9. Do not stack equipment; use racks and shelves appropriately.
10. Report any faulty equipment immediately to the Lab Guardian Douglas Paul and co-workers.
11. A fault with the fabric of the room, such as a lighting failure, should be reported through the Maintenance Request portal found on the Estates and Commercial Services webpage, http://www.gla.ac.uk/services/estates/.
12. The main door and the doors within the laboratory should be kept shut if not in use, for safety, security and noise reduction.
13. Keep access to doorways and pathways to exits clear of equipment and obstructions.
14. Dispose of packaging materials and empty the bins regularly. A dongle for the back door Level 2 to access the main recycling bins can be obtained from the Janitors on Level 4.
15. Store chemicals and solvents in the containers provided and store in the chemical cabinets in room 121. Waste chemical collection should be arranged as required (with Shona Ballantyne).
16. Visitors as well as long term research group members need to adhere to these guidelines.
17. For out of hours working (evening after 5 pm/weekend), please sign the book at reception on the first floor. Do not work in the building alone.
18. Good communication with other group members is essential. Group members are expected to participate in the weekly group meetings and e-mail Douglas Paul and other group members when issues occur.

4. Covid-19 Measures

1. Guidance from the HSE, UK Government and Scottish Government to manage the risk related to the Covid-19 pandemic must be applied to all the laboratories 119, 120, 121, 123 and 223A. These include physical distancing, frequent hand washing and hygiene measures, cough etiquettes and face covering in enclosed shared public space. Considerations for Codes of Practice and Risk Assessment for the James Watt School of Engineering have been taken into account.
2. Physical distancing requires a maximum capacity for each of the laboratories as follows:

   Rankine 119: 1 person
   Rankine 120: 2 people
   Rankine 121: 1 person
   Rankine 123: 2 people
   Rankine 223A: 2 people

   Only 1 person should enter any of the service areas at one time.

   Only 1 person should enter any of the corridors such as 118A, 122 or 116A which connect the laboratories to the main corridor on level 1.
3. Demand to use the laboratory will be managed by the Lab Guardian, Douglas Paul, liaising with the School Safety Co-ordinator. Collaboration and communication will be required between laboratory users, supervisors and the Lab Guardian to establish and adhere to a online working rota using the groups booking system. Impact on the overall occupancy of the Rankine Building will be reviewed by the Technical Services Manager.
4. Users must use gloves for using equipment in the laboratories especially where cleaning of the equipment may result in damage or misalignment of experiments. Laboratory users must wash their hands regularly and wipe any workstation surfaces, lab telephone, door handles,

materials and equipment at the start of their work and before leaving if gloves have not been used.

5. Lab users who feel they exhibit Covid-19 like symptoms or have been instructed to self-isolate as a result of contact tracing should not use the lab and should inform their supervisor and the Lab Guardian.
6. Emergency support (First Aiders and Fire Area Officer) may be constrained due to the Covid-19 restriction on building capacity. Task risk assessments need to be reviewed to include the above measures. These should take into account whether the work can be safely undertaken with reduced access to emergency support. A Covid-19 Risk Assessment template can be found here:
   https://www.gla.ac.uk/media/Media_723618_smxx.docx
7. Further information on Covid-19 guidance from the Government and HSE are available at:
   https://www.gov.scot/collections/coronavirus-covid-19-guidance/
   https://www.hse.gov.uk/news/assets/docs/working-safely-guide.pdf

Appendix I: Lasers

All lasers should be registered with John Nelson using the form available at https://www.gla.ac.uk/media/Media_628869_smxx.pdf

I.1. Edinburgh Instruments MTL-3GT Mini TEA CO_2 Laser

Location: Rankine 120
Wavelength: 9.2 to 11.6 μm
Pulse Energy: up to 150 mJ
Average Power: up to 10 W (normal operation << 10 W)
Class 4 Laser

Potential Risks:

1. The laser has enough power to cut steel and potentially start a fire.
2. Blindness from exposure to eyes.
3. Burns from exposing flesh to the laser beam.

Control Measures:

1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. PPE: The provided safety goggles for mid-infrared radiation must be used at all times.
3. The laser door interlock must be used with the laser at all times.
4. The provided beam stop must be used at all times.
5. If the laser beam is being used over beam paths greater than 0.5 m then appropriate precautions must be taken to indicate exactly where the beam path is and also to prevent any hands or other parts of people in the laboratory from being exposed to the beam. For example either the beam path should be protected by a pipe or using anodised aluminium boards either side to make clear exactly where the beam is being projected.
6. A power meter is provided to allow the position of the beam to be determined safely.
7. The beam should not be allowed to hit people, walls, optics benches or any other items in the laboratory. The beam stop will be used at all times.
8. The operator should never look down the beam path when the laser is switched on.

I.2. THz Quantum Cascade Lasers

Location: Rankine 120
Wavelength: 40 to 300 μm
Average Power: up to 100 mW (most are < 20 mW outside the cryostat in a diverging beam which is strongly attenuated in atmospheric air)
Class 3B and Class 3R

Potential Risks:

1. Blindness from exposure to eyes.

(N.B. while the energy of emission is 4 to 40 meV and the powers are quite modest, the exact effects of exposure to humans is not yet studied at this wavelength).

Control Measures:

1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. The beam path should be indicated using a pipe or anodised aluminium boards to prevent exposure to people.
3. Infrared safety goggles are provided and should be used if the operator is close to the beam path.

I.2 Silicon THz Impurity Lasers

Location: Rankine 120

Wavelength: 40 to 300 μm

Average Power: up to 10 mW (most are < 1 mW outside the cryostat in a diverging beam which is strongly attenuated in atmorpheric air)

Class 3R

Potential Risks:

1. Blindness from exposure to eyes.

(N.B. while the energy of emission is 4 to 40 meV and the powers are quite modest, the exact effects of exposure to humans is not yet studied at this wavelength).

Control Measures:

1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. Infrared safety goggles are provided and should be used if the operator is close to the beam path.

I.3 Daylight Solutions MIRCat Mid-infrared laser

Location: Rankine 123

Wavelength: 7.6 μm to 11.9 μm

Average power: up to 240 mW CW

Class 3B

Potential Risks:

1. Blindness from exposure to eyes.

Control Measures:

1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. PPE: The provided safety goggles for mid-infrared radiation must be used at all times.
3. The laser door interlock must be used with the laser at all times.
4. The beam should not be allowed to hit people, walls, optics benches or any other items in the laboratory. Beam stops and beam path boards should be used at all times if other users are using the laboratory.
5. The operator should never look down the beam path when the laser is switched on.

I.4 M Squared Laser SolsTis tunable Ti:S laser

Location: Rankine 223A

Wavelength: 725 nm to 875 nm

Average power: up to 1 W

Class 4

Potential Risks:
1. The laser has enough power to potentially start a fire.
2. Blindness from exposure to eyes.
3. Burns from exposing flesh to the laser beam.

Control Measures:
1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. PPE: The provided safety goggles for visible radiation must be used at all times.
3. The laser door interlock must be used with the laser at all times.
4. The provided beam stop must be used at all times.
5. If the laser beam is being used over beam paths greater than 0.5 m then appropriate precautions must be taken to indicate exactly where the beam path is and also to prevent any hands or other parts of people in the laboratory from being exposed to the beam. For example either the beam path should be protected by a pipe or using anodised aluminium boards either side to make clear exactly where the beam is being projected.
6. A power meter is provided to allow the position of the beam to be determined safely.
7. The beam should not be allowed to hit people, walls, optics benches or any other items in the laboratory. The beam stop will be used at all times.
8. The operator should never look down the beam path when the laser is switched on.

I.5 M Squared Laser Sprite-fs laser

Location: Rankine 119
Wavelength: 800 ± 20 nm
Average power: up to 1 W
Class 4

Potential Risks:
1. The laser has enough power to potentially start a fire.
2. Blindness from exposure to eyes.
3. Burns from exposing flesh to the laser beam.

Control Measures:
1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. PPE: The provided safety goggles for mid-infrared radiation must be used at all times.
3. The laser door interlock must be used with the laser at all times.
4. The provided beam stop must be used at all times.
5. If the laser beam is being used over beam paths greater than 0.5 m then appropriate precautions must be taken to indicate exactly where the beam path is and also to prevent any hands or other parts of people in the laboratory from being exposed to the beam. For example either the beam path should be protected by a pipe or using anodised aluminium boards either side to make clear exactly where the beam is being projected.
6. A power meter is provided to allow the position of the beam to be determined safely.
7. The beam should not be allowed to hit people, walls, optics benches or any other items in the laboratory. The beam stop will be used at all times.
8. The operator should never look down the beam path when the laser is switched on.

I.6 DFB, Fabry-Perot, SOA and external cavity lasers produced in the JWNC

Location: Rankine 223A
Wavelength: 700 to 1600 nm

Average power: up to 150 mW
Class 3R and 3B

Keysight 81608A Tunable Laser Source

Location: Rankine 123
Wavelength: 1490 nm to 1640 nm
Average power: up to 20 mW
Class 3R

I.7 Picoquant LDH Picosecond Laser Diode Heads – 3 systems with different wavelengths

Location: Rankine 119
Wavelength: 905 nm, 1310 (±20) nm and 1550 (±30) nm
Average power: up to 120 mW (905 nm), up to 50 mW (1310 nm) and up to 50 mW (1550 nm)
Class 3B but will typically be used as type 1 or 3R at low powers for single photon experiments

Potential Risks:
1. Blindness from exposure to eyes.

Control Measures:
1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. PPE: The provided safety goggles for near infrared radiation must be used at all times if the fibre optic delivery system is not used.
3. The beam will always be delivered through an optical fibre to prevent and minimise any potential exposure of users.
4. The beam from the laser head or the end of the optical fibre should not be allowed to hit people, walls, optics benches or any other items in the laboratory. Beam stops and beam path boards should be used at all times if other users are using the laboratory if the laser is being used in free space.
5. The operator should never look down the beam path when the laser is switched on.

I.8 WITec Confocal Raman Imaging, Atomic Force and Scanning Near-field Optical Microscope System

Frequency doubled Nd:YAG with output at 523 nm and 50 mW power output at the end of the optical fibre - Class 3B if not connected to the microscope.
785 nm 120 mW fibre coupled external cavity diode laser - Class 3B if not connected to the microscope.
Nd:YAG with output at 1064 nm with 500 mW power - Class 3B if not connected to the microscope.

Potential Risks:
1. Blindness from exposure to eyes.

Control Measures:
1. All the lasers for the confocal Raman microscopy system are fibre coupled and in normal operation should not provide any risk.
2. The lasers can only be switched on provided the optical fibres are connected to both the laser and the microscope.
3. The lasers should never be used if there is not an optical fibre connecting them to the microscope.
4. Operators should never look down an optical fibre when it is connected to the laser.
5. No mirror should be used to shine the laser beam delivered by the microscope outside of the microscope sample stage.

I.9 PL5 CO_2 Laser

Location: Rankine 120

The CO_2 PL5 laser is a step-tunable continuous wave (CW) infrared laser system designed to give high output powers in the 9-11 μm region. The laser is operated in a flowing gas mode to obtain highest output powers. The laser gain section is a single arm water-cooled discharge tube sealed with ZnSe Brewster windows in air cooled mounts. The optical resonator is supported on an invar rod frame to minimise cavity length changes caused by thermal expansion. The resonator consists of a partially reflecting ZnSe output coupling mirror and a blazed diffraction grating for wavelength tuning. The output coupler is mounted on a piezoelectric transducer (PZT) which allows fine control of the cavity length and output frequency. There is over 80 lines in the 9-11 μm region with over 50W output power on the strongest lines, but capable of producing 100W. The power supplies have the capability of delivering lethal amounts of energy (-40 kV at up to 300 mA). The system is a Class 4 laser.

Potential Risks:

1. The laser has enough power to potentially start a fire.
2. Blindness from exposure to eyes.
3. Burns from exposing flesh to the laser beam.

Control Measures:

1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. PPE: The provided safety goggles covering radiation between 9-11 μm must be used at all times.
3. The laser door interlock must be used with the laser at all times.
4. The provided beam stop must be used at all times.
5. If the laser beam is being used over beam paths greater than 0.5 m then appropriate precautions must be taken to indicate exactly where the beam path is and also to prevent any hands or other parts of people in the laboratory from being exposed to the beam. For example either the beam path should be protected by a pipe or using anodised aluminium boards either side to make clear exactly where the beam is being projected.
6. A power meter is provided to allow the position of the beam to be determined safely.
7. The beam should not be allowed to hit people, walls, optics benches or any other items in the laboratory. The beam stop will be used at all times.
8. The operator should never look down the beam path when the laser is switched on.
9. Only authorised and trained staff should use the setup.
10. Extreme care should be exercised during service procedures on the power supply or laser head when protective covers may be removed and interlocks overridden.

I.9 295 Far-Infrared (FIR) Laser

Location: Rankine 120

The optically pumped 295 FIR laser is based around a stable large-bore dielectric waveguide resonator which gives the system maximum flexibility over the 40um to 1.2mm wavelength range when pumped by the PL5 CO_2 laser. The cavity length is optimised through the adjustment of the output coupler which is coupled to a manually adjusted precision micrometre stage. The FIR laser's chamber is pumped by methanol resulting in a Terahertz emission lasing at 118.8um (2.52THz) with a maximum continuous wave power of 150mW. When operated under these conditions the laser is a Class 4 laser.

Potential Risks:

1. Blindness from exposure to eyes.

(N.B. while the energy of emission is 4 to 40 meV and the powers are below 150mW, the exact effects of exposure to humans is not yet studied at this wavelength).

Control Measures:

1. All operators must be registered with the Department Laser Safety Officer and trained in laser safety before operating the laser.
2. PPE: The provided safety goggles covering radiation between 9-11 μm must be used at all times because the CO_2 laser is always on when the FIR laser is operated.
3. The laser door interlock must be used with the laser at all times.
4. The provided beam stop must be used at all times.
5. If the laser beam is being used over beam paths greater than 0.5 m then appropriate precautions must be taken to indicate exactly where the beam path is and also to prevent any hands or other parts of people in the laboratory from being exposed to the beam. For example either the beam path should be protected by a pipe or using anodised aluminium boards either side to make clear exactly where the beam is being projected.
6. A power meter is provided to allow the position of the beam to be determined safely.
7. The beam should not be allowed to hit people, walls, optics benches or any other items in the laboratory. The beam stop will be used at all times.
8. The operator should never look down the beam path when the laser is switched on.

Appendix II: Gases

Gases: N_2, O_2, Ar, He, CO_2

Location: Cylinders are stored in Room 114A. Gas is delivered to rooms 119 and 120 at pressures below 5 bar.

Pressure: Room 114A - N_2 (230 bar), He, Ar and O_2 (200 bar), CO_2 (50 bar). All regulated down to below 5 bar for delivery to the laboratories in rooms 119 and 120.

Volume: 50 litres maximum at ATP.

Potential Risks:

1. Asphyxiation
2. Oxygen can enable a number of non-flammable materials to burn vigorously (Oxidising Agent 5.1)
3. High pressure build up (Compressed Gas 2)

Control Measures:

1. The oxygen monitor should be used at all times. Evacuate the room if the oxygen monitor is sounded. Do not re-enter until it is clear that the oxygen level is greater than 18% by using a hand-held oxygen monitor to check the level of oxygen. Batteries should be checked on the oxygen monitor before using a laboratory.
2. All gas cylinders must be fitted with an appropriate regulator. The regulators should be maintained below 5 bar.
3. Empty gas cylinders should only be changed by trained individuals. If you are not trained then get a technician to change the cylinder.
4. When not in use and overnight, all gas valves in the laboratory which are not in use should be closed.
5. If a gas line is not being used it should be disconnected and left without a connector. (This provides a safety shut-off for the pipe provided there is no blank connector in the socket).

Appendix III: Cryogens

Cryogens: Liquid He, liquid N_2

Locations: Room 119 and 120

Quantities: dewars will always have less than 100 litres of liquid

Potential Risks:

1. Cold burns

2. Asphyxiation
3. High pressure build-up

Control Measures:

1. A face mask or goggles should be used when decanting liquid He or liquid N_2.
2. Cryogenic safety gloves are provided and should be used when decanting liquid He or liquid N_2.
3. The oxygen monitor should be used at all times. Evacuate the room if the oxygen monitor is sounded. Do not re-enter until it is clear that the oxygen level is greater than 18% by using a hand-held oxygen monitor to check the level of oxygen.
4. All dewars should have the blow off connected to an exhaust line.
5. Pressure relief valves should be fitted to all dewars and cryogenic systems.

Appendix IV: Electrical Apparatus

All electrical equipment.

Potential Risks:

1. Electrocution -> potential death.
2. Electrical burns.
3. Flooding -> electrocution
4. Electrical shocks.

Control Measures:

1. Apparatus should be PAT tested and always correctly connected to an appropriate earthed supply.
2. Electrical equipment should be kept off the floor to prevent issues if the laboratory floods.
3. Most commercial electrical equipment should never be opened. Other electrical equipment should not be opened unless switched off and un-plugged from the mains. For apparatus which may have capacitors, actions should be taken to make sure that the capacitors have discharged before any apparatus is opened.
4. All wires should have electrically insulating coatings to prevent electric shocks. Where uninsulated wires or connectors have to be used, they should be covered with appropriate protective insulating covers to prevent any electrical shocks.
5. Do not hold bare connectors or bare wires when there is a risk that they could be live and produce and electric shock or electrocution. If bare wires or connectors have to be touched then make sure they are earthed and without any electric charge before touching.

Appendix V: Cryostats and He Compressors (Oxford Instruments AC14 optical cryostat, Teslatron and Lakeshore Cryogenic probe station)

Potential Risks:

1. High pressure build-up in cryostat or He lines -> explosion
2. Cold burns
3. Asphyxiation

Control Measures:

1. Untrained people should not operate the cryostats or He compressors.
2. In normal operation, there is no danger from the He compressors.
3. Only qualified people should undertake maintenance where the operating instructions must be followed.
4. Only trained people should operate the cryostats after undertaking a risk assessment to understand the potential risks and the control measures to mitigate all risks. The health and safety and operating instructions provided by the manufacturer for each cryostat must be adhered to at all times.

5. The oxygen monitor should be used at all times. Evacuate the room if the oxygen monitor is sounded. Do not re-enter until it is clear that the oxygen level is greater than 18% by using a hand-held oxygen monitor to check the level of oxygen.
6. The Oxford Instruments Tesletron has a 12 T magnet. When operating the light in the corridor 118A and safety signs must be displayed. The magnetic field can be sufficiently strong to stop mechanical pace makers so warnings to anyone entering the corridor 118A and the labs 119 and 120 must be provided.
7. Where heat guns are used they must not be left running without supervision as this has a serious fire risk. Also make sure all heat guns are switched off and unplugged after use and before leaving the laboratory.

Vacuum Pumps and Lines

Potential Risks:

1. Fire
2. Pressure build up and explosion / implosion

Control Measures:

1. The pumps require annual servicing to maintain the correct amount of oil. Fires can start if the oil the level of oil reduces below the minimum requirement for the pump.
2. Gloves should be worn when changing or topping up the pump oil in the vacuum pumps.
3. With cryogenic gases and liquids being pumped through the vacuum lines, if a failure occurs to a pump or valve then pressure could potentially build up. Appropriate pressure relief values should be fitted to all systems to prevent explosions from high pressure build up.
4. All vacuum pumps must have the exhausts connected to the extracts so that all extracted fumes are extracted to outside the building.
5. When handling items that will be in vacuum systems, gloves must be worn and all grease from handling should be removed with a solvent such as acetone followed by a propan-2-ol rinse (provided the solvents do not damage the item).

Appendix VI: Chemicals

Acetone

Potential Risks

1. Flammable
2. Irritant

Control Measures

1. Only small quantities below 200 ml should be kept in a laboratory at any time.
2. Gloves that are acetone resistant should be used for handling.
3. Safety goggles must be used when handling.
4. Any large bottles and the waste bottles must be stored in the chemical cabinets in room 121.
5. A chemical spill mat is available in room 121 for large or small spills.
6. Disposal must be into a waste bottle before carrying out the building chemical disposal procedures (https://www.gla.ac.uk/media/Media_217874_smxx.pdf).
7. Acetone should not be disposed of down a sink, drain or toilet.

Propan-2-ol

Potential Risks

1. Flammable
2. Irritant

Control Measures

1. Only small quantities below 200 ml should be kept in a laboratory at any time.
2. Gloves that are acetone resistant should be used for handling.
3. Safety goggles must be used when handling.
4. Any large bottles and the waste bottles must be stored in the chemical cabinets in room 121.
5. A chemical spill mat is available in room 121 for large or small spills.
6. Disposal must be into a waste bottle before carrying out the building chemical disposal procedures (https://www.gla.ac.uk/media/Media_217874_smxx.pdf).
7. Propan-2-ol should not be disposed of down a sink, drain or toilet.

Polisher

Potential risks

1. Small particles of silicon or germanium. These are non-toxic but can form dust which could be inhaled.

Control Measures

1. The water should always be running when samples are being polished to prevent any dusk and to guarantee that all small particles will be removed and washed down the drain.
2. Gloves should be used when handling samples to maintain cleanliness of the sample but also to prevent any small particles of silicon or germanium from contaminating hands.

Laboratory Users

All users of laboratories 119, 120, 123 and 223A are required to read and sign this document before using the laboratory.

By signing below I state that I have read and understood the risk assessment and potential hazards in rooms 119, 120, 123 and 223A and will at all times undertake safe practice and abide by the rules in this document. If any equipment is found to be faulty I will immediately report it to Prof Douglas Paul.

Name (PRINT)	**Role**	**Signed**	**Date**	**Countersigned**	**Date**
Douglas Paul	Lab Guardian / supervisor				
Ross Miller					
Kevin Gallacher					
Muhammad Mirza					
Euan McBrearty					
Joao Valente					
Jaroslaw Kirdoda					
Eugenio di Gaetano					
Ugne Griskeviciute					
Martin Sinclair					
Conor Coughlan					
Richard Middlemiss					
Scott Watson					
Ivonne Escorcia Carranza					
Vincenzo Pusino					
Thomas Nowack					
Vera Biryukova					
Bhavana Benakaprasad					