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| Risk Assessment | | | | | |
| **PROCEDURE:**   * Complete risk assessment in consultation with PI/Supervisor and technical staff as appropriate. * Risk assessment checked and signed by PI/Supervisor * A copy or scan of the signed document to be given to the lab technician, School Safety Adviser and PI/Supervisor.   **NOTES:**   * No laboratory work is to commence without a risk assessment signed by the PI/Supervisor. * The risk assessment must be reviewed when any changes are made to the equipment, materials, procedure or personnel. * Technical staff can stop work if no risk assessment is in place or if, in their opinion, there is a risk to safety. * Examples of how to complete this form are available at [www.hse.gov.uk/risk/casestudies/](http://www.hse.gov.uk/risk/casestudies/) | | | | | |
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| **Project name:** | Superconducting and Superinsulating Nanofluids | | | | |
| **Location of work:** | Home Study, FRASER NOBLE 057 | | | | |
| **Principal Investigator/Supervisor:** | Dr Marcus Bannerman | | Signed: | | Date: |
| **Assessment Prepared by:** | Asad Mohiuddin | | Signed: | | Date: 28/11/18 |
| **Outline description of the work:** | Review nanofluids and their history in thermal conductivity enhancement. This includes describing what models have already been used to approximate their behaviour and critically review their applicability.  Construct a Transient Heated Wire cell for the testing of liquid and gas mixture thermal conductivities and use this data to explore the anomalous heat transfer in nanofluids and gas mixtures which have similar dimensional properties to nanofluid systems.  Perform molecular simulations of thermal conduction to confirm if transient effects in the thermal conductivity, possible at small time/length scales, dominate conduction. These simulations may be molecular dynamics simulations using DynamO, or coupled kinetic theory-hydrodynamics simulations using code developed by Craig Moir, a PhD student at Aberdeen.  Explore new heat exchanger designs which incorporate any time-dependent anomalous phenomena. | | | | |
| **Names of persons carrying out the work:** | Asad Mohiuddin (Student), Craig Moir (PhD Student), Dr Marcus Bannerman (Supervisor) | | | | |

| **What are the hazards?** | **Who might be harmed and how?** | **What are you already doing?** | **Do you need to do anything else to manage this risk?** | **Action by whom?** | **Action by when?** | **Done** |
| --- | --- | --- | --- | --- | --- | --- |
| Lifting heavy tools and equipment | Student – Back and neck injuries | Ask for assistance when moving items. | No | Student | Continuous |  |
| Slipping and/or tripping | Student – Bruises, skeletal damage | Keep the floor clear of any unnecessary obstructions. Use wet floor sign when appropriate. | No | Student | Continuous |  |
| Extended exposure to computer screen | Student – Headache, Sore eyes | Apply a blue light filter to keep retina healthy. Take regular breaks away from the screen. | No | Student | Continuous |  |
| Soldering skin contact | Student – Temporary scars and burns | Take care when handling soldering iron. Insure the soldering iron is switched off or on its stand when not being used. Keep burnt skin under running cold water. | No | Student | Continuous |  |
| Inhalation of melting flux from soldering | Student, Bystanders – Dizziness, headache, coughs | The smoke is harmless but long exposures can lead to discussed symptoms. Take regular breaks and avoid breathing directly into smoke. | No. But potentially in the future consideration in installing a fume extraction system. | Student | Continuous |  |
| Malfunctioning of circuitry and equipment | Student, Bystanders – Electrical Fire | Take appropriate electrical fire precautions. Keep food and drinks away from electrical equipment. Read manual before handling equipment. | No | Student | Continuous |  |
| Risk assessment for the future of the project (not currently used) | | | | | | |
| Helium Gas | Student, Bystanders –  Asphyxiation | Insure that the environment is well ventilated. | No | Student | Continuous |  |
| Hydrogen Gas | Student, Bystanders – Flammable, Explosive | Use inert hydrogen gas. Keep the gas under the lower flammability. | No | Student | Continuous |  |
| Water bath | Student – Water spillage, hot water/steam | Avoid moving the water bath if it contains water. Avoid excessive heating of the water. | No | Student | Continuous |  |