Job Description

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| **Job Title:** | RAC 1 Lab Technologist |
| **Department:** | Institute for Quantum Computing (IQC) |
| **Reports To**: | Director, Quantum NanoFab |
| **Jobs Reporting:** | None |
| **Salary Grade:** | USG 8 |
| **Effective Date:** | April 2019 |

## Primary Purpose

The RAC 1 Lab Technologist position is tasked with advancing science and engineering of quantum devices by developing and maintaining processes essential to the fabrication, assembly, characterization and application of these devices. There is a wide range of such processes that have to date relied on graduate students and postdocs to develop. By engaging a full time staff member for these science and engineering activities we elevate the professionalism of the final product, and the staff will be more capable of maintaining a long term record of process performance and be better able to recognize both new opportunities for further improvements and new challenges to process robustness.

As this is a new lab there will be some initial lab set-up activities relating to equipment acquisitions and installations. However, the prime responsibility remains on the development of processes to advance the science and engineering of quantum devices. The incumbent is involved directly in research activities, and interacts on a day-to-day basis with laboratory technical staff and research personnel as well as graduate students in providing thorough and consistent cleanroom and equipment operator training and guidance.

## Key Accountabilities

**Process Development for Research Activities**

- Develop processes for specific science and engineering outcomes on an ongoing basis as new outcomes are requested by community members
- Document and maintain processes that relate to fabrication, assembly, characterization and application of quantum devices
- Keep a record of the history of the process and its uses
- Train users in the correct, effective and safe operation of processes
- Collaborate with users on new requirements

**Operation of Scientific Processes**

- Mechanical cutting, slicing, lapping and polishing of a wide range of substrates and materials used in the fabrication of advanced quantum and other devices
- Chemical etching, cleaning and surface treatment of substrate materials and thin films using various caustic, acid and organic solutions
- Oxygen and argon plasma surface treatments
- Vacuum deposition of thin films on prepared substrates
- Microscopy and electrical probing & mechanical pulling processes
- Micro and macro assembly of prepared components and sub-assemblies into partial or complete experimental setups or devices in both standard and “cleanroom” type lab environments

**Scientific Training**

- Draft, test and publish revision-tracked equipment standard operations procedures (SOPs) including the documentation of specialty chemical, surface preparation, treatment, thin film deposition and mechanical assembly processes
- Develop and document comprehensive hands-on-training plans for these SOPs and specialty processes
- Provide ongoing equipment operator and specialty process training programs to graduate students, postdoctoral fellows and other researchers, including review of specific associated hazards and safety considerations
- Where appropriate, devises equipment operator tests to ensure new users have a good understanding of equipment operation before being granted the right to operate equipment independently.
- Assigns lab user equipment access privileges on a per-equipment basis.
- Responsible for establishing and maintaining a detailed record of Safety Data Sheets (SDS) for all chemicals in use in the RAC1 lab.
- Responsible for ensuring safe handling, storage and disposal of chemicals used in the RAC1 cleanroom lab site.
- In conjunction with his/her immediate supervisor, may be tasked with performing monthly safety inspections of the RAC1 cleanroom lab as required by provincial legislation.

**Research Infrastructure Development**

- With guidance from the Director, identify required pieces of lab equipment for installation in the RAC1 shared cleanroom & support lab. As required, work with Principal Investigators to help them ensure, to the extent requested, that equipment specifications will meet their research needs. In all cases incumbent studies plans as required to ensure that the equipment of interest can be suitably accommodated in the RAC1 lab space.
- With guidance from the Director and Principal Investigators, identify potential equipment vendors and work directly with these to obtain detailed budgetary quotes.
- As required, participate in the creation and evaluation of Requests for Proposals (RFPs) by working with UWaterloo Procurement & members of the proposal evaluation committee.
- Oversee the installation, testing and commissioning of new lab equipment under the incumbent's direct responsibility. Where appropriate, incumbent may be tasked with installing and running required services to simple pieces of lab equipment such as microscopes, electrical probe stations, ovens, vacuum deposition systems, etc.
- Where applicable and with assistance from his/her peers on the Quantum NanoFab team, incumbent enables shared access to research infrastructure at RAC 1, consistent with Quantum Nanofab's practices.
- Incumbent may on occasion be asked to participate in equipment acquisitions and installations located outside of his/her immediate scope of responsibility (ie., equipment to be installed in other Quantum NanoFab sites or affiliated sites in either the QNC building or in the RAC2 building).

**Equipment Development**

- Manage the upkeep and modification of experimental setups and associated lab equipment, consistent with the dynamic nature of research activities.
- Responsible for the maintenance, troubleshooting, repair and routine cleaning of the scientific processes which encompass a wide variety of experimental set ups.
- Responsible for creating equipment and facility procedures and logs via the use of the Quantum NanoFab's existing lab management software platform and its password-protected website.
- Responsible for keeping track of and ordering all process inputs (e.g., equipment, parts, consumables) necessary to operate the experimental set ups.
- Incumbent may be asked to assist with similar lab equipment activities in the QNC or RAC2 satellite labs.

**Resident Lab Expert**

- Incumbent's expertise may be called upon in the development of new research-specific lab experiments or setups.
- Enforces all lab safety and access requirements and takes immediate action to remedy non-compliance, including the removal of access privileges consistent with existing Quantum NanoFab policies. The latter is done with support from incumbent's immediate supervisor.
- He/she is expected to work in tight collaboration with his/her peers on the technical team to ensure extensive knowledge exchange. Everyone is expected to share their expertise freely and openly on an ongoing basis to the team's overall benefit.

**All employees of the University are expected to follow University and departmental health and safety policy, procedures and work practices at all times. Employees are also responsible for the completion of all health and safety training, as assigned. Employees with staff supervision and/or management responsibilities will ensure that assigned staff abide by the above, and actively identify, assess and correct health and safety hazards, as required.*

## Required Qualifications

**Education**

- College-level degree in a relevant 3-year engineering technology program (mechanical, electrical or controls)

**Experience**

- 1-3 years of experience working in a technical lab environment is required.
- Some experience working with chemicals in a wet process lab & excellent understanding of safe lab practices.

**Knowledge/Skills/Abilities**

- Excellent mechanical assembly skills complemented by basic electronics and control systems knowledge.
- Excellent grasp and use of common software platforms including MS Word and Excel.
- Experience with design software such as Solidworks, AutoCAD, etc., is an asset but not required.
- Experience with vacuum systems is an asset, but not required.
- Excellent written and oral communication and interpersonal skills.
- Ability to be firm in the application of lab protocols & policies while exhibiting exemplary tact & diplomacy in dealing with people from a broad range of educational and cultural backgrounds.

## Nature and Scope

- **Contacts:** Internally, works with graduate students and with his/her peers on the Quantum NanoFab team. Interacts with other university departments such as Procurement, Plant Operations Maintenance group, Environmental Waste, Chemistry Stores, etc. Works occasionally with Principal Investigators. Externally, works with equipment and supplies vendors.
- **Level of Responsibility:** As manager of this site, this position is responsible for the safe operation of the RAC1 Cleanroom lab. Incumbent influences all capital equipment and consumables acquisitions. Incumbent provides leadership and guidance to all users of the lab, including the authority to grant and restrict lab user access as a function of eligibility, minimum training and safety policy requirements. Site manager devises equipment training plans and executes these plans consistently across the entire lab user base.
- **Decision-Making Authority:** The incumbent is expected to work independently in carrying out all tasks under their scope. In complex or unusual situations the incumbent is expected to seek assistance both within and outside the Quantum NanoFab team as required.

- **Physical and Sensory Demands**: Extensive time may be spent either sitting or standing in front of various equipment including fume hoods. Flexibility is required when servicing or repairing equipment under the incumbent's responsibility. In the course of receiving / shipping / installing new machine components this position may occasionally require the lifting of objects weighing up to 40lbs.
- **Working Environment:** Much of the time is spent working in a cleanroom environment where cleanroom gowning (head to toe) must be worn. Extended periods of time will be spent under yellow lighting conditions. Some time will be spent wearing personal protective equipment (PPE) such as face shields, Tyvek aprons and thick nitrile gloves when training people on the safe use of fume hoods and/or assisting in the development of new chemical processes or procedures. There are some deadline pressures, while at the same time there is a constant demand for thoroughness, accuracy and acute attention to detail.