**PREP Research Associate**

This position is part of the National Institute of Standards and Technology (NIST) Professional Research Experience Program (PREP). NIST recognizes that its research staff may want to collaborate with researchers at academic institutions on specific projects of mutual interest and, therefore, requires those institutions to be recipients of a PREP award. The PREP program involves staff from a wide range of backgrounds conducting scientific research across various fields. Individuals in this position will perform technical work supporting the collaboration's scientific research.

**Research Title:**
Nanofabrication and metrology specialist

**The work will entail:**
This work aims to develop processes for fabricating novel materials and structures, with the goal of characterizing and analyzing the fundamental physics of these systems. For more information about the group, see: https://www.nist.gov/pml/nanoscale-device-characterization-division/nanoscale-processes-and-measurements-group/scanning.

**U.S. Citizen Preferred**

**Key responsibilities will include but are not limited to:**

- Designing and fabricating van der Waals heterostructure devices, including rhombohedral graphene and twisted graphene multilayers, for investigation with scanning probe microscopy.
- Fabrication of superlattices in 2d materials via e-beam lithography.
- Perform measurements with scanning probe microscopy techniques.
- Presenting results at internal meetings, and occasional meetings with external stakeholders.
- Ensuring that results, protocols, software, and documentation have been archived or otherwise transmitted to the larger organization.

**Qualifications**

- A PhD degree in experimental condensed matter physics.
- Five years of experience in fabricating nanoscale patterns at complex oxide interfaces using conductive atomic force microscopy (c-AFM) and ultra-low voltage electron beam lithography (ULV-EBL).
- Three years of experience in nanoscale patterning of ferroelectric materials, using ultra-low voltage electron beam lithography.
- Five years of experience in cleanroom-based nanofabrication of nanoelectronics and quantum devices, including layout design, fume hood, resist-based lithography (photolithography and electron-beam lithography), thin-film deposition and etching.
- Three years of experience in fabricating two-dimensional layered material devices, including graphene and hexagonal boron nitride heterostructures stacking and transferring.
- Five years of experience in electrical transport measurements at ultra-low temperatures.
- Five years of experience in radio frequency (RF) measurements at ultra-low temperatures.
- Five years of experience in the maintenance and operation of a dilution refrigerator.
- Five years of experience in handling cryogens, including liquid helium transfer.

- Experience in operating a multi-modal measurements scanning probe system, including STM, AFM, and electrical transport measurements in a single system operating at ultra-low temperatures and in ultra-high vacuum.
- Experience in the preparation of atomically sharp probe tips for STM and AFM measurements.
- Experience with ultra-high vacuum (UHV) techniques, including assembly, types of UHV pumps, in-situ ion sputtering, and reflection high-energy electron diffraction (RHEED) measurements.
- Experience in dilute atom evaporation in UHV for SPM experiments on single isolated deposited atoms.
- Five years of experience in research of complex oxide physics, including in $LaAlO_3/SrTiO_3$ (LAO/STO) heterostructures, with a least three peer-reviewed publications.
- Three years of experience in research of 2D quantum materials, including graphene-based heterostructures and related van der Waals materials.
- Research experience in superconducting materials.
- Research experience with SPM probe-based superconducting Josephson junctions.
- Five years of experience in developing and programming LabVIEW VIs for electrical transport measurements and spectroscopic mapping of STM and AFM measurements on the Nanonis SPM control system platform.
- Five years of experience in developing and programming LabVIEW Vis for general instrument control and transport measurements.

**Privacy Act Statement**

**Authority:** 15 U.S.C. § 278g-1(e)(1) and (e)(3) and 15 U.S.C. § 272(b) and (c)

**Purpose:** The National Institute for Standards and Technology (NIST) hosts the Professional Research Experience Program (PREP) which is designed to provide valuable laboratory experience and financial assistance to undergraduates, post-bachelor's degree holders, graduate students, master's degree holders, postdocs, and faculty.

PREP is a 5-year cooperative agreement between NIST laboratories and participating PREP Universities to establish a collaborative research relationship between NIST and U.S. institutions of higher education in the following disciplines including (but may not be limited to) biochemistry, biological sciences, chemistry, computer science, engineering, electronics, materials science, mathematics, nanoscale science, neutron science, physical science, physics, and statistics. This collection of information is needed to facilitate administrative functions of the PREP Program.

**Routine Uses:** NIST will use the information collected to perform the requisite reviews of the applications to determine eligibility, and to meet programmatic requirements. Disclosure of this information is also subject to all the published routine uses as identified in the Privacy Act System of Records Notices: NIST-1: NIST Associates.

**Disclosure:** Furnishing this information is voluntary. When you submit the form, you are indicating your voluntary consent for NIST to use of the information you submit for the purpose stated.