

PREP Research Associate

This position is part of the National Institute of Standards (NIST) Professional Research Experience (PREP) program. NIST recognizes that its research staff may wish to collaborate with researchers at academic institutions on specific projects of mutual interest and thus requires that such institutions be the recipients of a PREP award. The PREP program requires staff from a wide range of backgrounds to work on scientific research in many areas. Employees in this position will perform technical work that underpins the scientific research of the collaboration.

Research Title: Long-Term Materials Durability in Immersion Cooling

The work will entail:

PREP Researcher associate will continue to conduct research on failure analysis and degradation mechanism study of polymer exposed to accelerated laboratory testing environments and operation conditions. Understanding the degradation mechanism of polymeric components used in immersion cooling during services is critical to the development and assurance of AI physical Infrastructure. In this study, non-destructive and destructive techniques will be developed for the failure analysis and degradation mechanism of polymeric components in aged samples after accelerated multi-stress testing. The mechanisms of chemical, physical, and mechanical degradation will be studied using spectroscopic, microscopic, and mechanical techniques, such as attenuated total reflection Fourier-transform infrared spectroscopy (ATR-FTIR), micro-IR, laser scanning confocal microscopy, and tensile tester. The results will be used to understand the root causes of polymer failure, providing a scientific basis for test method development, material selection, and product quality assurance AI physical Infrastructure.

The candidate will be responsible for activities associated with

- 1) designing and developing a testbed for accelerated multi-stress testing of materials used in immersion cooling systems, including thermal, chemical, mechanical, electrical, and hygrothermal cycling,
- 2) conducting chemical, physical, and mechanical characterization of polymer components used in immersion cooling systems during accelerated multi-stress testing.
- 3) evaluating the long-term durability and reliability of immersion cooling systems and developing service-life prediction models for various polymer components.
- 4) analyzing and interpreting experimental data; presenting research findings; and preparing test protocols, technical standards, reports, and peer-reviewed journal publications.

Qualifications

- **U.S. Citizenship preferred.**
- A master's degree in materials science and engineering, mechanical, or chemical engineering background, with at least 3 years of relevant professional experience.
- 3+ years of research experience in multilayer failure analysis, surface/interface characterization, and polymer durability assessment.
- 3+ years of experience applying machine learning, deep learning, and other AI methods to polymer degradation and service-life prediction.

- Extensive hands-on experience with characterization of multilayer polymeric materials, including microscopy (confocal microscopy, AFM), spectroscopy (ATR-FTIR, Raman, UV-Vis) and mechanical and adhesion properties
- Proven ability to develop predictive models for the degradation, durability, and service-life performance of polymer components.
- Advanced proficiency in Python, R (including package development), and Origin for end-to-end data management, processing, visualization, and modeling.
- Familiarity with international testing standards (e.g., ASTM, ISO, IEEE) for polymers, with demonstrated ability to develop, validate, and document new or modified test methods.

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.