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Opportunity Title: Prediction of Mechanical Behaviors of Heat-Resistant Structural Alloys Using Digital Twin Technologies
Opportunity Reference Code: NETL-Postdoc-2026-Gao2

Organization National Energy Technology Laboratory (NETL)

Reference Code NETL-Postdoc-2026-Gao2

How to Apply A complete application consists of:

- An application, including academic history, work history experiences, and honors/awards
- Description of your goals, related experience, and related skills – refer to NETL's Core Competencies and ongoing projects when applicable
- Transcripts – Click here for detailed information about acceptable transcripts
- A current resume or CV
- Two educational or professional recommendations
  You must provide contact information for at least two recommenders in your application. The first two recommendations received will be attached to your application for review by NETL. You may click the "send" (paper airplane) button to send the recommendation request email immediately after entering their information prior to submitting your application; if not, a request will automatically be sent when you submit your application. Your recommenders will receive an email with a subject line of "[Your Name] - ORISE Recommendation Request - [your email]", from Zintellect@orau.org. This email will include information on the opportunity to which you have applied, as well as a secure link to submit a recommendation for you for this application. If you ask the same person to submit a recommendation for you for multiple applications in Zintellect, they must click the unique link in each email request, but will be given the opportunity to copy over what they had previously submitted.

All documents must be in English or include an official English translation.

If you have questions about the application process, contact NETLinfo@orau.org.

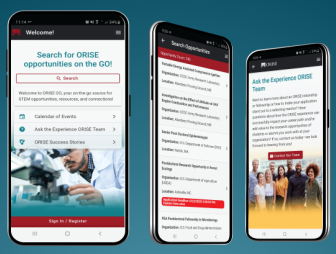
After you have submitted an application in Zintellect, you may reach out to internship.program@netl.doe.gov to request to talk with the hosting researcher if you would like additional information on the project or to express particular interest. You must have a completed application in Zintellect to receive a response.

Application Tips

NETL values a combination of academic success, experience, and leadership potential as demonstrated in all aspects of your application. NETL's goal is to create, maintain, and support a diverse environment that encourages creative ideas and leadership. In the words of former Lab Director Brian Anderson, "our differences make us stronger and we're united in fostering inclusivity in all aspects of our research to drive innovation and deliver solutions for an environmentally sustainable and prosperous energy future." In your application, show us who you are!

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To increase your chances of being selected for an appointment, we recommend:

1. Reading about NETL projects, and tailoring your responses to align with Laboratory focus areas. What parts of the project(s) are most interesting to you?
2. Spending sufficient time on your essay responses and your resume. Give yourself time to review your writing!
3. Ensuring that everything you submit is grammatically correct and clearly expressed.
   - Consider using a word processor to draft your answers and then copy and paste into the application.
   - Review and edit repeatedly until you have a strong response.
   - Ask someone whose judgement you trust to proofread it and make suggestions for improvement.
   - Efficient writing is valued over quantity of writing.
4. Submitting the application -- we can't select you if you don't submit an application!

Application Deadline 12/31/2026 11:59:59 PM Eastern Time Zone

Description The National Energy Technology Laboratory's (NETL's) record of success has been built on understanding the future of energy and the technologies required to make that future possible. We've long touted our success in developing the technologies that took on acid rain in the 1970s and mercury in the early 2000s.

Program Goals

The NETL Postdoctoral Research Fellowship Program (Postdoc) is a high-intensity program designed to identify recent Doctoral graduates of high promise and to foster advanced skill development. It allows the postdoc to systematically outline career goals and helps provide the means of achieving these goals. NETL principal investigators and leads serve as mentors to postdoctoral participants during the program. This interaction affords the postdoc a unique opportunity to develop critical skills needed to become an independent professional.

The program goals include providing the opportunity to participants to:

- Develop skills and knowledge in their field of study
- Engage with new areas of basic and applied research
- Transition classroom theory into hands-on experience
- Network with world-class scientists
- Exchange ideas and skills with the Laboratory community
- Use state-of-the-art equipment
- Contribute to answers for today's pressing scientific questions
- Collaborate with the broader scientific and technical communities

Project Details

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Through the Oak Ridge Institute for Science and Education (ORISE), this posting seeks a post-Doctoral researcher to engage in projects with the Research Innovation Center (RIC) at the National Energy Technology Laboratory (NETL) in the area of Power, Fuels & Chemicals under the mentorship of Michael Gao. This project will be conducted off-site/virtually but hosted by the NETL Albany, Oregon campus.

The overarching project aims to develop predictive capabilities for the long-term performance and lifetime of heat-resistant structural alloys subjected to fatigue, creep, and creep-fatigue interaction under industrial operating conditions. Materials of interest include, but are not limited to, Brazed Aluminum Heat Exchangers (BAHX), nickel-based superalloys, heat-resistant steels, and high-entropy alloys. The research conducted under this appointment will examine the effects of microstructural features and defects, including precipitates, vacancies, interstitials, stacking faults, twins, dislocations, grain boundaries, and surfaces. The participant will be a part of interdisciplinary team to examining reliable and computationally efficient frameworks for predicting long-term creep and fatigue behavior while accounting for microstructural evolution. Research approaches focus on digital twin technologies (including physics-informed, data-driven, and deep learning-based approaches) as well as density functional theory, machine learning interatomic potential, molecular dynamics, Monte Carlo simulations, and finite element method.

The selected applicant will gain experience in multi-scale computational modeling and machine learning of mechanical behavior of theatre-resistant alloys, and interact with researchers from other national laboratories and industries.

Stipend: The selected participant will receive a monthly stipend commensurate with educational level and experience

- Post-Doctoral stipend is $8455 per month.

Program Requirements: To document the effectiveness of the program, participants are required to submit a pre-appointment and post-appointment survey, as well as a reflection on their appointment experience when they renew or end their appointment. The reflection should summarize their project(s), additional activities, and overall experience. Details are provided as the appointment end date approaches.
Participants may also have the opportunity to contribute to manuscripts, journal articles, book chapters, conference presentations, posters, patents, and other publications as a part of their appointment. Such achievements should also be reported to ORISE; additional details are provided after an offer has been accepted.

The National Energy Technology Laboratory (NETL), part of the U.S. Department of Energy (DOE) national laboratory system, is owned and operated by the DOE. NETL supports the DOE mission to advance the energy security of the United States. This is an educational opportunity offered by NETL and administered by the Oak Ridge Institute for Science and Education. Participants in the program are not considered employees of NETL, DOE, the program administrator, or any other office or agency.

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Qualifications To be eligible, you must either:

- have received a Doctoral degree within the last five years *or* be currently enrolled in a Doctoral degree program and complete the degree prior to the appointment start date.

The ideal candidate would have some, but not necessarily all, knowledge of and skills in:

- Ph.D. in Materials Science, Physics, or a closely related discipline.
- Research experience in dislocation modeling and simulation, and density functional theory calculations
- Proficiency in artificial intelligence, machine learning, and/or machine learning interatomic potential
- Previous peer-reviewed publications.
- Programming skills.
- Ability to conduct independent research in a multi-disciplinary team.

Point of Contact Jordan

Eligibility Requirements

- **Degree:** Doctoral Degree received within the last 60 months or currently pursuing.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12)
  - **Communications and Graphics Design** (2)
  - **Computer, Information, and Data Sciences** (17)
  - **Earth and Geosciences** (21)
  - **Engineering** (29)
  - **Environmental and Marine Sciences** (14)
  - **Life Health and Medical Sciences** (51)
  - **Mathematics and Statistics** (11)
  - **Physics** (16)
  - **Science & Engineering-related** (2)
  - **Social and Behavioral Sciences** (29)
- **Age:** Must be 18 years of age

Affirmation I certify that I attend or attended a regionally accredited college or university and:

- Have an earned a Doctoral degree no more than five years before the date of application.

  OR

- Will receive a Doctoral degree by the appointment start date