

Job Title: Post-doctoral Research Associate in Nuclear Ceramics
Contract Type: Full time, 2 years; must be able to work in US
Salary: ~\$50,000/ year, negotiable; full medical benefits
Closing Date: November 1, 2017

Position description:

Candidate will take a strong role in an international program focusing on understanding the effects of chemistry and microstructure on the dissolution of simplified and simulated UO₂ based used nuclear fuels. Primary work will be performed at Washington State University in Pullman with the potential opportunity to spend some time on-site at Pacific Northwest National Laboratory. Ability to be very organized and work in a fast-paced, multi-disciplinary environment is essential. Specific technical and other qualifications are detailed following.

Project description:

This project aims to develop fundamental understanding on the effects of simulated used nuclear fuel (UNF) chemistry and microstructure on its dissolution in geologic repository conditions, through an integrated program delivered by US-UK research partnership. This understanding will underpin maturation of models for UNF evolution under repository conditions, enabling reliable prediction of degradation and long-term performance to provide confidence in UNF for up to one million years.

While the US has delayed research on Yucca Mountain geologic repository for UNF and high level waste, research continues in other countries and through the US Department of Energy to identify and resolve knowledge gaps relating to the long-term degradation of UNF after emplacement. Fundamental mechanistic understanding is of paramount importance for US and international waste management programs which seek to satisfy citizens and regulators regarding the reliability of long-term degradation predictions for UNF originating from a variety of fuel designs, burnups, reactor operations, and storage.

The goal of this work is to explore the effects on UO₂ dissolution of 1) fuel microstructure and single- and multi-species doping, 2) oxidizing radiolysis products presence, 3) cladding presence, and 4) canister overpack residue, as a function of relevant parameters including temperature, pH, and oxidizing and reducing environment. The overarching aims of this work will be two-fold: (i) understanding the *microstructure* effects on dissolution, including grain size, strain, UO₂ stoichiometry and impurity species; (ii) understanding the influence of *near field materials* on the dissolution of UO₂ and related analogues. A longer project description can be found at: https://neup.inl.gov/FY17%20Abstracts/CFA-17-13054_TechnicalAbstract_2017CFATechnicalAbstract17-13054.pdf

Send resume and cover letter addressing the qualifications on the following page to:

John S. McCloy, PhD.

Associate Professor, School of Mechanical & Materials Engineering, Washington State University
Director, Materials Science & Engineering Program, Washington State University

Chief Scientist, Joint Appointee, Pacific Northwest National Laboratory

Visiting Professor, Nuclear Materials, Dept of Materials Science & Eng, University of Sheffield

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#	Selection Criteria	Essential	Desirable
Qualifications & Experience			
1	First degree (or equivalent experience) in chemistry, physics, materials science, nuclear engineering, or other relevant discipline	X	
2	Hold or be close to completion of PhD in chemistry, physics, materials science, nuclear engineering, or other relevant discipline	X	
3	Knowledge and experience relevant to the project aims, including understanding of structure-property relations in ceramic materials	X	
4	Knowledge and experience in ceramics processing (chemical powder synthesis, batching, firing, annealing)	X	
5	Knowledge and experience of relevant characterization techniques including XRD, SEM, TEM, AFM, vibrational spectroscopy, luminescent spectroscopy, and other solid-state analysis methods	X	
6	Demonstrated ability to perform research in the primary scientific literature to gain new knowledge and experience for analysis, data interpretation, and idea generation	X	
7	Knowledge and experience with electrochemical testing, especially scanning electrochemical force microscopy		X
8	Knowledge and experience with synchrotron or neutron methods, analysis, and/or preparation and submission of proposals for access to large scale facilities		X
Management Skills			
9	Potential to develop leadership and management skills appropriate to take on supporting role within the research group		X
10	Ability to supervise students and other researchers associated with the project	X	
Communication skills			
11	Effective communication skills, both written and verbal, and experience delivering presentations in a clear, interesting, concise, and understandable manner	X	
12	Ability to communicate effectively with project partners in a collaborative project	X	
13	Ability to communicate results to academic and industrial audiences, both domestic and international, as evidenced by good publication record and attendance at conferences for current career stage	X	
Team Working			
14	Ability to work within a university research group and in collaboration with external partners, including universities, industry, and national laboratories	X	
Problem Solving and Decision Making			
15	Ability to independently develop creative solutions to problems	X	
Project Management			
16	Ability to organize own research work and meet deadlines for research deliverables	X	
17	Ability to submit regular progress reports to specified deadlines	X	
Personal Effectiveness			
18	Ability to develop and maintain a network of contacts throughout own work area		X