FY2021 Faculty Development Awards

Academic Institution	Amount Awarded	Title of Proposal
Pennsylvania State University	$450,000.00	Faculty Development Grant for Radiochemistry and Applications of Neutron Irradiation
Oregon State University	$450,000.00	Faculty Development Program in Radioactive Materials Characterization at Oregon State
University of Tennessee	$450,000.00	Faculty Development Program in Nuclear Fusion Safety at the University of Tennessee
University of Nevada, Reno	$450,000.00	University of Nevada, Reno Faculty Development Program in Nuclear Waste Forms
Purdue University	$450,000.00	Purdue Nuclear Engineering Junior Faculty Development Program
Texas A&M University	$450,000.00	Faculty Development Program in Nuclear Engineering at Texas A&M University
San Jose State University	$300,000.00	Re-establishing Nuclear Science Research at SJSU
Idaho State University	$450,000.00	Faculty Development Program in Nuclear Engineering at Idaho State University
Virginia Polytechnic Institute and State University	$350,168.00	Virginia Tech Multi-Campus Nuclear Engineering Faculty Development Program
Ohio State University	$450,000.00	The Ohio State University Nuclear Engineering Faculty Development Program
Clemson University	$450,000.00	Junior Faculty Position in Actinide Chemistry at Clemson University

Faculty Development Grant for Radiochemistry and Applications of Neutron Irradiation

Executive Summary:

Nuclear energy is a clean, safe, reliable and cost-effective source of electricity, which should be increasingly relied upon to fulfill the country's energy needs while reducing greenhouse emissions. The ability to understand radiochemistry and its effects on irradiated materials is essential to the optimization of advanced nuclear power. Methods used to understand and establish the safe handling of nuclear materials, nuclear chemistry, and component reliability for future advanced nuclear reactors is also an important aspect of nuclear safety and operation. Moreover, expanding a thriving workforce development pipeline is critical to supporting the future needs of the NRC and its endeavors.

This proposal seeks start-up funds for a tenure-track faculty member in the Ken and Mary Alice Lindquist Department of Nuclear Engineering with expertise in the field of radiochemistry and applications of neutron irradiation. The candidate is in her second year of her tenure track as an assistant professor of nuclear engineering (her curriculum vitae is in Attachment 4), even though she started in the department during fall 2019. She is a nuclear engineer and radiochemist with graduate school and postdoctoral experience in environmental actinide chemistry, medical isotope purification, advanced reprocessing techniques for used nuclear fuel, and advanced nuclear fuels. She also has extensive experience in neutron irradiation studies as a research associate and research assistant professor in the Radiation Science and Engineering Center at the Penn State Breazeale Reactor prior to joining the nuclear engineering department faculty. In addition, she has expertise in various nuclear technologies including radioisotope development and modeling of actinides in geological repository safety assessments. Her expertise in these areas is directly applicable to many of the current needs in advanced non-light water reactors.

Principal Investigator: Jean Paul Allain, allain@psu.edu

Faculty Development Program in Radioactive Materials Characterization at Oregon State University

Executive Summary:

OSU NSE has recently hired an untenured, tenure-track assistant professor with research and teaching interests in Radiochemistry. The program outlined in this proposal will support the development of this faculty member and their research and teaching programs through the purchase of equipment, support for a graduate student, summer salary for the faculty member, and miscellaneous funds spent on operational costs for this work. This work describe here applies directly to one of the areas of interest identified by the NRC—"Characterization, handling, fabrication, transportation, storage, or disposal of fresh and spent nuclear fuel for nuclear power plants (including the various advanced reactor designs that are currently under development)."

The search that resulted in the faculty members hiring was broadly conducted in the areas of nuclear engineering. The hiring is aligned with the OSU College of Engineering Strategic Plan, the mission of OSU NSE, and the needs of the nuclear science and engineering field. The development program outlined in this work will build on the success of a formal faculty development program developed under a previous NRC grant. The Sustained Impactful Growth of Nuclear Academic Leaders (SIGNAL) program was developed at OSU under a previous NRC Faculty Development grant. The mission of the SIGNAL program is “to establish Oregon State University's School of Nuclear Science and Engineering as a premier institution for the development of future academic leaders.” Processes and procedures developed under our SIGNAL program will be used to manage and evaluate the effectiveness of our development program in relation to our faculty hire.

Principal Investigator: Brian Woods, brian.woods@oregonstate.edu

Faculty Development Program in Nuclear Fusion Safety at the University of Tennessee

Executive Summary:

The University of Tennessee Nuclear Engineering (UTNE) Department has a well-established and successful relationship with the US Nuclear Regulatory Commission's (US NRC's) Nuclear Education Grant Program that dates back to its inception. This synergistic relationship has supported several junior faculty members at UTK, of which 8 have already successfully acquired the rank of tenured Associate Professor, with 3 on track for tenure. The impact of the US NRC's grant program upon our Nuclear Engineering Department is evident and will benefit the nation, as these 10 individuals represent educators and researchers who will play key roles in the development of our future nuclear workforce and thus supporting the design, construction, operation, and regulation of nuclear facilities and the safe handling of nuclear materials for years to come. The objective of this program is to develop our newest faculty member to achieve excellence in research, teaching, and service; with an emphasis on NRC relevant topics related to Nuclear Fusion Safety.

The requested funding from the NRC is $450,000 over a 3-year period, with a $150,000 matching from UTK non-federal sources. This budget includes support for new course development, research proposal support, professional society meetings participation, research paper preparation and publication, travel, graduate student support, equipment, supplies, and other scholarly needs.

Principal Investigator: J. Wesley Hines

University of Nevada, Reno Faculty Development Program in Nuclear Waste Forms

Executive Summary:

The need to migrate away from fossil fuels and the inability of renewable power to provide enough base load electricity has led to the re-emergence of nuclear power. Advanced nuclear reactors, such as molten salt reactors (MSRs), have safety as a core part of their designs. For these new reactors, there needs to be a waste management plan that addresses the disposal of nuclear wastes and used nuclear fuels. University of Nevada, Reno (UNR) has recently hired a faculty conducting research in these areas. This proposal requests support from the U.S. Nuclear Regulatory Commission (NRC) to support her waste form development research program, specifically focused on halide salt waste. Such a research program is essential to ensure the safe development and sustainable operation of Gen IV MSRs. The UNR faculty development program proposes to supplement the funding of $450,000 requested from the NRC with $150,000 of its own resources to enhance our existing research and teaching program in Nuclear Materials and make it more sustainable. An internal mentoring committee, as well as an external scientific advisory board have been formed to mentor the beneficiary and to provide guidance and evaluate the effectiveness of this grant, respectively. The overarching aim is to develop a robust workforce by increasing the number and diversity of Americans with a strong background in the development and operation of nuclear power facilities.

Principal Investigator: Dev Chidambaram, dcc@unr.edu

Purdue Nuclear Engineering Junior Faculty Development Program

Executive Summary:

The present proposal develops Purdue Nuclear Engineering Junior Faculty Development Program and requests support for two tenure-track assistant professors in the Schools of Nuclear Engineering (SNE) at Purdue University. The U.S. NRC Faculty Development Grant together with the matching fund provided by the SNE helps them carry out their plans for the scholarship of research and creative accomplishments, the scholarship of teaching and the scholarly engagement in the areas specified by NRC. The proposed program is designed to sustainably enable and ensure the success of the two tenure-track junior faculty by helping them establish firm ground for their career development, preparing them for career advancement towards tenured faculty members, and retaining & promoting them to become preeminent faculty, so that they educate nuclear engineering workforce who will provide technical expertise essential in the advancement of nuclear technology. In view of these goals, a coherent management system structured jointly by the School Head im collaboration with multiple senior faculty is established through mentoring programs employing various platforms. A carefully developed evaluation plan with rubrics and metrics characteristic to areas of major importance for junior faculty's career development allows the PI and the mentors to identify faculty's strength as well as weakness and help develop suitable roadmap to ensure success towards his/her career advancement.

Principal Investigator: Seungjin Kim, seungjin@purdue.edu

Faculty Development Program in Nuclear Engineering at Texas A&M University

Executive summary:

The goal of this proposal is to provide foundational support for a recently-hired tenure-track faculty member in nuclear materials, and a new tenure track faculty hire beginning September 2023. Funding will be used to help the new faculty build their research program into self-sustaining and externally funded programs that strengthen current research directions at Texas A&M, and expand into new areas to diversify the research portfolio at the university. The support will also enable the new faculty to develop new educational offerings to enhance the student experience at TAMU, and further develop the nuclear workforce.

The recently hired and the new faculty member proposes innovative research plans that are consistent with the priorities of the TAMU Department of Nuclear Engineering, and further the educational and research mission of the department. Research directions will also be aligned with NRC strategic priorities. They will therefore build foundations for independent careers as researchers and educators.

The recently-hired tenure-track faculty's research Program will focus on the discovery and qualification of materials for use in extreme environments for advanced nuclear reactors. This work builds upon existing strengths at TAMU in materials for advanced reactors and fuel cycles, adding complementary capabilities in corrosion and high temperature mechanical behavior to establish a full featured program in advanced reactor materials research, discovery, development, and qualification.

Principal Investigator: Michael Nastasi, mikenastasi@tamu.edu

Re-establishing Nuclear Science Research at SJSU

Executive summary:

This is a project proposal to support a new nuclear chemistry faculty at San Jose´ State University (SJSU) through the UNLP's Faculty Development Grant, with the goal of re-vitalizing nuclear science research at the university. SJSU has the institutional support, infrastructure, and historical connections to retain and support a thriving nuclear chemistry faculty career. Specifically, this project would fund the early career faculty's research into actinide thin film production and characterization, for use in nuclear reaction studies using uranium and thorium targets. Being a primarily undergraduate institution, the project would integrate undergraduate researchers, thereby introducing and training the next generation of the nuclear workforce. And, since SJSU is also a minority serving institution, this project would also help in the important efforts to broaden and diversify the nuclear workforce pipeline.

Principal Investigator: Karen Singmaster, karen.singmaster@sjsu.edu

Faculty Development Program in Nuclear Engineering at Idaho State University

Executive summary:

The program seeks to support the development and ultimate retention through successful integration into the Nuclear Engineering (NE) Dept. of a new junior faculty member, who joined in Fall 2019. Idaho State University (ISU) is one of the 25 universities with an actively operating NRC licensed research reactor (AGN-201M) in the US and offers a BS in nuclear engineering and MS and Ph.D. in nuclear science and engineering. The Nuclear Engineering program at ISU is one of six ABET-accredited programs west of the Mississippi and the sole ABET program within Idaho State to offer a BS in Nuclear Engineering. The program currently has 90-100 undergraduate and 40 graduate admitted students. In recognition of the growing program and the need to fill strategic gaps in research and teaching in the department, ISU hired two new faculty members in 2019, and the College of Science and Engineering (CoSE) Dean plans to add two additional NE faculty members to support the recognized graduate and undergraduate admission expansion. A faculty member central to the proposed ISU Junior Faculty Development Program (FDP), will develop innovative and multidisciplinary research by building a state-of-the-art research laboratory, designing and teaching new undergraduate and graduate courses currently unavailable in ISU's curriculum, and engaging in student mentorship. His research focuses on accelerating the development of experimental and computational research and an educational focus on addressing gaps in small modular and advanced non-water reactors thermal-hydraulic and safety analysis under severe accident conditions. One topic of interest is developing high fidelity data to addressing the impact of fission gas ejection from failed fuel rod(s) on the safety of small modular and advanced non-water-cooled reactors. The program plans to establish research activities on the Idaho Falls campus and strengthen collaboration with national laboratories, especially Idaho National Lab (INL), one of the leading nuclear energy research and development laboratories within walking distance of the campus. The 2021 Nuclear Regulatory Commission (NRC) support for three years, partially matched by Idaho State University, is crucial to providing the funds to enhance his qualifications and expertise as a newly hired faculty member. These funds will enable the Nuclear Engineering department to continuously offer high-quality education and workforce training through educational and research programs established by junior faculty.

Principal Investigator: Chad Pope, popechad@isu.edu

Virginia Tech Multi-Campus Nuclear Engineering Faculty Development Program

Executive summary:

In 2014, VT-NEP received a formal approval from the State Council of Higher Education for Virginia (SCHEV) to award Doctor of Philosophy (PhD), Master of Science (MS), and Master of Engineering (MENG) degrees in Nuclear Engineering that is unique in the State of Virginia. Since May 2014, the program has awarded 8 PhDs, 11 MS, and 7 MENGs in Nuclear Engineering. Three of the MENG graduates received PhD's in Physics, simultaneously. Although new and small, NEP is making a difference in the US nuclear education and research by contributing to the advancement of nuclear science and technology and by training highly qualified graduates. Thus far, three of the PhDs are hired by peer institutions as assistant professor and research faculty, and the rest are hired by national labs and private organizations.

We propose to establish a new faculty development program in support of further enhancement of the NEP program at two campuses, including Blacksburg and the Greater Washington DC metro region. More specifically, this proposal seeks funding for partial startup funding for a new outstanding faculty member with preferred expertise in the areas of reactor physics and particle transport methods and application, but other areas such nuclear materials, radiation detection and detector design with emphasis in nuclear nonproliferation and safeguards with be invited to apply

This proposal seeks in support of hiring a highly qualified faculty member. To accomplish the goals of this project, the Department of Mechanical Engineering will provide a matching funds to cover the new programs' administrative and management expenses.

Principal Investigator: Alireza Haghighat, haghighat@vt.edu

The Ohio State University Nuclear Engineering Faculty Development Program

Executive Summary:

Project Objective
The Nuclear Engineering program at the Ohio State University is planning to start an undergraduate major in Nuclear Engineering, as a direct result of university's new strategy to expand jobs opportunities in the state of Ohio in terms of undergraduate student population. We are envisioning hiring 5 new faculty in the next a few years to bring the faculty number to 12, with a strong support from College of Engineering. One of the Nuclear Engineering Programs strategic objectives involves growth sufficient to support an undergraduate Nuclear Engineering Program in addition to the existing graduate program. There is a significant benefit from this award since it will be the first hiring of the expansion plan. While college will provide strong financial support to the expansion, the NRC faculty development grant will set up the stage for the foreseeable rapid development.

The objectives of the project are to provide startup funding over a three-year period for a new faculty member to provide excellence in teaching and research to meet not only the demands of nuclear energy, but also lead our expansion plan. The technical area in which the hire will be made will be in an area of high interest defined by the NRC associated with advanced reactor development, safety analysis, thermal-hydraulics, and advanced instrumentation development. In part the selection decision of the candidate could be influenced by the technical interests of the most qualified candidates.

Project Activities
The project activities include identification of candidates, selection of a candidate, mentoring in support of growth of the candidate in teaching, the performance of research, publication, involvement in service activities, and advancement along a tenure track.

Principal Investigator: Lei Raymond Cao, cao.152@osu.edu

Junior Faculty Position in Actinide Chemistry at Clemson University

Executive Summary:

This proposal seeks start-up package funds for a new tenure-track faculty position in the area of actinide chemistry that can contribute to the academic and research goals of the Center for Nuclear Environmental Engineering Sciences and Radioactive Waste Management (NEESRWM) at Clemson University. This faculty member will develop a unique research program that complements existing expertise within NEESRWM. During a recent self-assessment of NEESRWM, it was determined that a new tenure track, junior faculty position housed in the Department of Chemistry with a research and educational focus on actinide chemistry would be the most beneficial to the growth of the nuclear science and engineering research at Clemson University at this time. Given the wide range of educational and research needs of the nuclear community, it is critical to produce graduates who can understand and address the multifaceted problems that arise from nuclear power production. In particular, since Clemson University holds a broad scope radioactive materials license, we have the licensing and safety infrastructure to allow training of students in the handling of actinide materials. This is a unique aspect of our program that only few in the country can provide. Thus, we seek to hire a junior faculty member with expertise in actinide chemistry who can not only interface with other colleagues in the Department of Chemistry but also with faculty across the university through the NEESRWM Center. The faculty candidate could have an earned degree in chemistry, inorganic chemistry, radiochemistry, chemical engineering, material science, or a related field. The goal is to hire the best candidate to complement the research expertise in the NEESRWM Center while contributing to the academic program of the Department of Chemistry. The Deans of the College of Science and Chair of the Department of Chemistry have supported this effort and the Provost has approved the position with the search to begin next year. Thus, this proposal seeks supplementary funds for the start-up package for the approved junior faculty position. The successful candidate is expected to teach undergraduate and graduate-level radiochemistry and actinide chemistry courses as well as advise MS and PhD students. Additionally, the successful candidate is expected to develop a high-quality, well-funded sponsored research program, and be recognized within the American Chemical Society.

Principal Investigator: Brian A. Powell, bpowell@clemson.edu