
**Develop a thermophysical and chemical lab for environment-sensitive nuclear materials at
Oregon State University**

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ABSTRACT:

*This project aims to enhance Oregon State University (OSU)'s capabilities to handle and comprehensively characterize air- and water-sensitive nuclear materials, including (fuel-bearing) molten salts, liquid and solid metallic fuels, etc., by developing a **THE**rmophysical and **cheM**ical lab for environment-sensitive **NUCLE**ar **mAt**eRials (The Thermonuclear lab). Such nuclear materials are proposed as fuel and coolant materials for multiple designs of advanced nuclear reactors and the essential materials for pyroprocessing techniques. Although several national laboratories have capabilities to handle and characterize environment-sensitive nuclear materials, such capabilities are rare to find in universities. This creates an infrastructure gap in both university research and education of future workforce supporting U.S. nuclear sector. The Thermonuclear lab will enable receiving, handling, processing (drying and thermal treatment), analyzing the thermophysical and chemical properties (density, thermal stability, decomposition and reaction, heat capacity, phase transformation, viscosity, etc.) of environment-sensitive radioactive materials, and preparing the materials for other existing OSU nuclear-material facilities. Collectively, the proposed and existing facilities will place OSU in a leading position to perform state-of-the-art research and education on environmental-sensitive nuclear materials and provide unique training opportunities for the future workforce of the U.S. nuclear sector. The team is well-suited for developing this Thermonuclear lab because of their experience in relevant R&D projects and managing nuclear-material user facilities. Particularly, the PIs have extensive experience working with molten salts, liquid fuel metals, metallic nuclear fuels, etc. The new lab will also be used in both undergraduate and graduate student education. Two new experimental modules will be developed and embedded in existing undergraduate and graduate courses that are currently offered.*

The key **outcomes** of this project are the establishment of environment-sensitive-radioactive-material R&D capabilities and a user facility at OSU and the development of a career pipeline for students to participate in relevant research at national laboratories and the nuclear industry.