



Office of
Nuclear Energy

Nuclear Energy University Programs (NEUP) Salt Behavior in Molten Salt Reactors

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Brian K. Robinson

Program Manager

Office of Advance Reactor Technologies

Advanced Reactor Technologies Program Overview, Mission & Structure

- Program Mission:
 - To research and develop advanced technologies to significantly improve the efficiency, safety, and performance of advanced reactor systems.
- Program Structure (RC-2):
 - Program Director – Alice Caponiti (DOE-HQ)
 - Federal POC – Brian K. Robinson (DOE-HQ)
 - Technical POC – Dr. David Holcomb (ORNL)

Advanced Reactor Technologies Research Questions

R&D programs are working to address several high level questions related to advanced reactor development and deployment include:

- How can we improve the affordability of nuclear power?
- How can we improve the inherent safety of advanced nuclear reactors?
- How can we improve on the proliferation resistance of advanced reactors?
- How can we expand nuclear technologies into non-traditional nuclear energy markets?
- How can we increase the performance and efficiency of advanced nuclear plants through new materials, advanced systems or components?

University Interest in Advanced Reactor Technologies R&D

- A variety of Molten Salt Reactor (MSR) technologies has been proposed:
 - Identifying, characterizing, and qualifying **successful salt and materials combinations**
 - Developing an integrated **reactor performance modeling** capability that captures the appropriate physics needed to evaluate plant performance over all appropriate timescales and license designs
 - Establishing a **national salt reactor infrastructure and economy** that includes affordable and practical systems for the production, processing, transportation, and storage of radioactive salt constituents
 - Licensing and safeguards framework development to guide research, development and demonstration
- Innovative R&D proposals are solicited in the areas of:
 - Development of a Thermochemical Database for Understanding Salt Behavior in MSRs
 - Thermodynamic models and values are needed to predict MSR characteristics
 - Innovations in MSR fuel salt capsule irradiation
 - Accelerate and decrease the cost of fuel salt irradiation
- The outputs from these projects will fold back into our R&D programs to support the advancement of advanced reactors.

Recent NEUP Awards

Examples of awarded NEUP Advanced Reactor Technology R&D:

FY17

- Methods to Predict Thermal Radiation and to Design Scaled Separate and Integral Effects Testing For Molten Salt Reactors
- Radiative Heat Transport and Optical Characterization of High Temperature Molten Salts
- Bimetallic Composite (Incoloy 800H/Ni-201) Development and Compatibility in Flowing FLiBe as a Molten Salt Reactor Structural Material
- A complete list o the FY17 winning proposals can be found at:
https://neup.inl.gov/SitePages/FY17_RandD_Awards.aspx

Questions?