Goals of the MSEE

- Determine and understand the properties of molten salts, including their atomic-scale structure and dynamics, as well as their chemistry under irradiation and at interfaces
- Establish new benchmarks of understanding atomic scale structure and chemical behavior for key model systems
- Accurately predict important atomistic level properties that are the basis of the physical and chemical properties of molten salt systems

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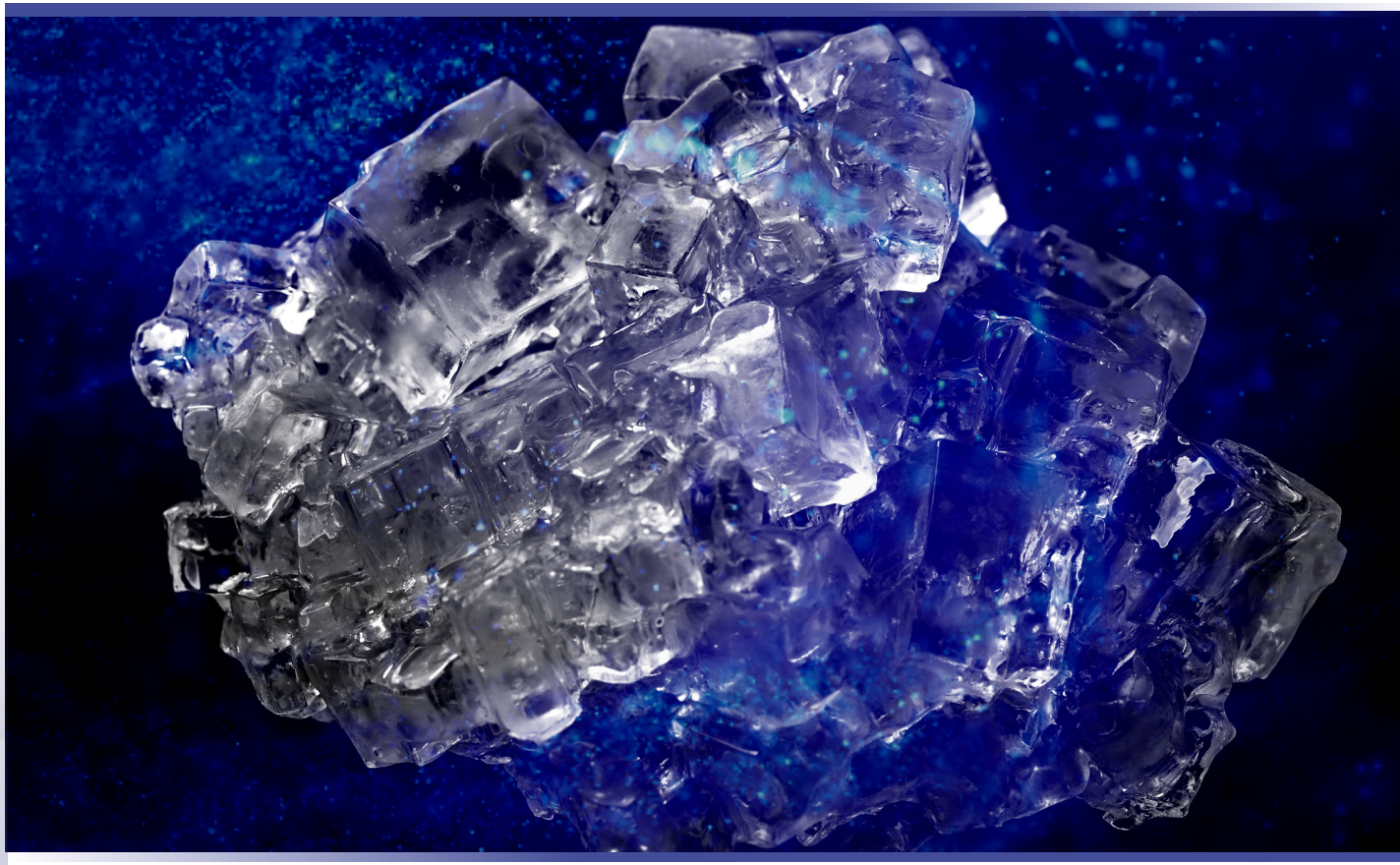
MSEE
molten salts in extreme environments

Molten Salts in Extreme Environments Energy Frontier Research Center



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What is an EFRC?

The U.S. Department of Energy's Office of Basic Energy Sciences created Energy Frontier Research Centers (EFRC) to bring together creative, multi-disciplinary scientific teams to tackle the toughest scientific challenges preventing advances in energy technologies.

Molten Salts Reactors

Molten Salt Reactors (MSRs) are one of the leading candidates for the next-generation of nuclear reactors. MSRs offer potentially game-changing technology that is cost-competitive, safe, and a more sustainable commercial nuclear power option. Predictive tools for the properties of complex molten salt mixtures and their interactions are necessary to realize this goal, based on a strong foundation of experimental and theoretical expertise and capabilities.

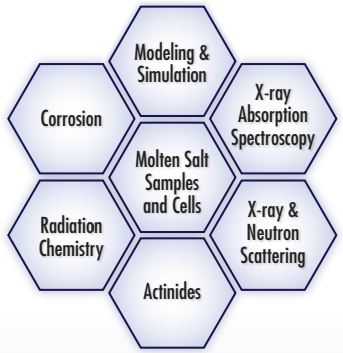
EFRC for Molten Salts in Extreme Environments (MSEE)

Research Challenge

The MSEE research center was established to advance molten salt nuclear reactor technology through a fundamental understanding of molten salt bulk and interfacial chemistry, specifically the physics and chemistry of molten salts, interactions with solutes (actinides, fission products, and corrosion products), and the effects of radiation interactions and degradation of reactor materials.

Research Structure

Includes two interrelated thrusts:



Thrust 1. Molten salt properties and reactivity, with the aim of:

- Determining the structure and dynamics of molten salt solutions across multiple length and temperature scales
- Elucidating the principles that control metal-ion and nanoparticle solvation in molten salts
- Understanding how radiation affects salt solution chemistry and solute speciation

Thrust 2. Interfacial and Corrosion Processes in Molten salt environments, with the aim of:

- Measuring and predicting the structures and dynamics of molten salts at interfaces
- Understanding kinetics of interfacial reactions leading to corrosion