

Molten Salt Chemistry: Fundamentals and Applications

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Molten salts are drawing significant attention as key materials for advanced nuclear energy systems, notably in pyroprocessing and molten chloride fast reactors (MCFRs). While their unique physicochemical properties unlock new pathways for efficient fuel recycling and sustainable nuclear fuel cycles, they also introduce complex scientific and engineering challenges. This lecture covers the fundamentals of molten salt chemistry, focusing on key thermodynamic, optical, electrochemical, and corrosion phenomena. Recent advances in spectroscopic and electrochemical characterization techniques for actinide and lanthanide systems will be highlighted, alongside the corrosion behavior of structural materials in high-temperature molten chlorides. Finally, the pivotal role of molten salt chemistry in realizing next-generation nuclear technologies and the future research directions for their safe and reliable deployment will be discussed.

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Invited Speaker, Session: "Molten Salt Chemistry and Pyroprocessing for Advanced Nuclear Fuel Cycles"