# Thermophysical Property Measurements of Molten Fluoride and Chloride Salts

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Molten salts have shown immense potential in high-temperature applications including Gen IV molten salt reactor (MSR) designs. Despite its potential, the lack of thermal conductivity data, attributed to the corrosive and electrically conductive nature of salts, hinders MSR development. Common measurement methods are prone to errors due to unaccounted heat losses, convection effects, and electrical interference. We have developed a modified transient hot-wire technique, employing a needle probe with electrically insulated wires, sheathed for protection against corrosive salts. Acting as an inner cylinder in a concentric configuration, the probe controls convection, measuring the transient temperature response to a heated wire. Theoretical modeling fits the temperature profile to determine thermal conductivity with an accuracy within 20% for salts up to 750°C.

The probe has successfully measured chloride and fluoride salts, including binary and ternary mixtures (LiF-NaF, LiF-NaF-KF, LiCl-KCl). Collaboration with Oak Ridge National Lab (ORNL) will verify and expand these thermal conductivity measurements using their variable gap apparatus. Thermal conductivity measurements on actinide bearing salts will be conducted, along with viscosity measurements using ORNL's rolling ball apparatus. The obtained thermophysical data are vital for DOE-regulated Nuclear Energy Advanced Modeling and Simulation (NEAMS) tools, empowering accurate modeling and design of molten salt reactors for nuclear energy developers.