

PROJECT OBJECTIVES

Goal: Characterize corrosion and investigate corrosion mitigation strategies that will enable operation above 850°C with a molten salt Heat Transfer Fluid.

- *Not many corrosion characterizations for molten salt systems above 850°C have not been detailed in the literature*

Innovation: Developing detailed corrosion mechanism studies and modeling will allow better design of molten salt heat transfer systems

- *This work will develop a fundamental understanding of corrosion in molten salts in a temperature region where not much data is available*

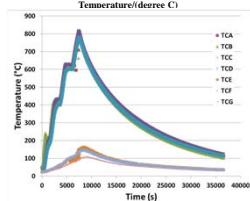
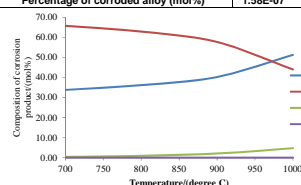
Milestones: Plan experimental research, place subcontracts, order supplies

APPROACH

- The overall project approach will combine corrosion rate and mechanism characterization, together with thermodynamic and fluid dynamic modeling, and service lifetime prediction. The results from these efforts will be used to quantify corrosion rates, propose and model corrosion mechanisms, and correlate these measurements with service lifetime. Experimental efforts will focus on molten salt systems above 800°C. Modeling will include thermodynamic minimization of Gibbs energy, electrochemical kinetics modeling

KEY RESULTS AND OUTCOMES

Phase	Corrosion Products (mol%)				Corrosion Products (moles)			
	700	800	900	1000	700	800	900	1000
MnF2	33.81	36.19	40.25	51.28	5.34E-10	5.28E-09	4.84E-08	5.21E-07
CrF2	65.83	62.91	57.74	44	1.04E-09	9.18E-09	6.95E-08	4.47E-07
AlF3	0.36	0.9	2.01	4.72	5.72E-12	1.31E-10	2.42E-09	4.80E-08
CrF3	0	0	0	0	1.81E-19	2.18E-17	1.82E-15	1.14E-13
Total amount of corrosion product (moles)					1.58E-09	1.46E-08	1.20E-07	1.02E-06
Percentage of corroded alloy (mol%)					1.58E-07	1.46E-06	1.20E-05	1.02E-04



- Completed Reactor and Furnace Construction
- Finished thermal profile testing and adjustment of furnaces
- Predicted stable corrosion products for 1 metal in 2 salts in 2 different atmospheres over a range of temperatures

NEXT MILESTONES

- 6/30 – Milestone 1.1.1 – Commission High Temperature Corrosion System
- 7/30 – Milestone 1.1.2 – Complete Comparison of Corrosion Rates with Literature Data under similar conditions

Risks

- Deliveries of molten salts have been slow. Currently, working off of reserves and need to be resupplied.