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Electrochemical measurements in molten salts

Recently, molten salts have been proposed for numerous applications: as coolants for advanced nuclear fission and fusion reactors, and as thermal vectors for thermal energy transfer. The characterization and understanding of the chemical behavior and mass transport of corrosion products and other solutes in the molten salt is critical for the design, licensing and operation of the various plants. Electrochemical techniques provide a powerful set of tools to investigate these phenomena. In addition, electrochemical techniques provide a direct approach to continuously monitor salt quality during operation, avoiding the need for sampling and subsequent analysis. The present study aims to investigate high temperature electrochemical techniques for the study and monitoring of corrosion in molten salt environments. A further objective is to assess the applicability in field cases of interest and to explore challenges in key areas of the energy transition (e.g. fusion, TES, CCUS). In order to carry out these analyses, an experimental cell for molten salts electrochemistry is proposed that can operate up to 800℃, in controlled environment, with the possibility of gas sweep, gas sampling and analysis. The cell can support a variety of materials and electrode configurations and potentiodynamic sweep, linear polarization resistance and other DC techniques have been applied.

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