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Editorial on the Molten Salt and Deposit-Induced Corrosion

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Corrosion mechanisms in the presence of molten salts and under deposits have been studied for over 50 years. Still, they remain an important topic because of their relevance in various technological sectors, including energy production and storage, aeronautics, the glass industry, etc. The degradation in this form of corrosion is often quite significant. It occurs over a wide temperature and pressure range with very complex phenomena clearly influenced by the presence of (even at the ppm level) corrosive species.

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The following papers aim to elucidate the underlying mechanisms that govern corrosion and propose future avenues of investigation on this topic for various practical applications, some of them aiming to protect multiple materials. In particular, the following aspects are covered:

- Thermodynamic and kinetic considerations of the degradation mechanisms.
- Use of specific experimental set-ups to accelerate testing of materials under various conditions.
- Role of the materials chemistry and microstructure as well as the chemistry of the salt and the surrounding atmosphere on the resistance of various nickel-based alloys and steels.
- Influence of protection methods (pre-oxidation and coating) on hot corrosion mechanisms in different molten media.

It will be shown that despite improved knowledge of the mechanisms involved in molten salts and under-deposit corrosion, many questions remain open that will nourish the scientific investigations for at least 50 years more. Coupling the results with advanced characterization techniques and with a better thermodynamic (and electrochemical) background will appear necessary.

The following papers are contributions from the “Molten Salt and Deposit-Induced Corrosion” session of the 11th International Conference on High-Temperature Corrosion and Protection of Materials (HTCPM 2024), held at Les Embiez Island, France, on 9–14 June 2024.

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