DLR Smart Technology for Molten Salt Health Assessment (SmaTeAs)

Why is Molten Salt Health Assessment Important for Safe Operation?

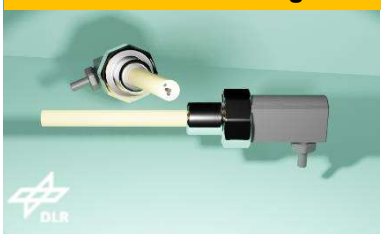
Molten Salt Corrosion in Chemical Boilers, Source: https://www.chemicalboiler.com/forensicengineering/molten-salt-corrosion/

Molten salt health issues lead to

- Piping and tank leakage by salt corrosion
- Failure of key components like molten salt pump, valve, receiver, e-heater, etc. by salt corrosion
- Operational failure due to change of key salt properties (e.g., melting point) by salt decomposition
- Huge economic losses caused by downtime of power plants, e.g., >100 k$/day for a 100MW Concentrated Solar Power (CSP) plant

Overview of DLR Possible Solutions for Safe Operation

1. Salt Monitoring



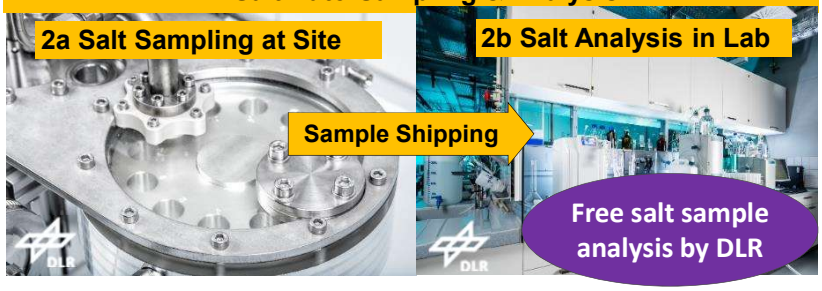
Permanent & rapid monitoring of salt health status by electrochemical in-situ sensors

3. Salt Level/Leakage Detection

Reliable binary signal to detect existence of molten salt for process control

2. Salt Auto-Sampling & Analysis

Permanent and accurate long-term salt sampling record with minimum personnel resources

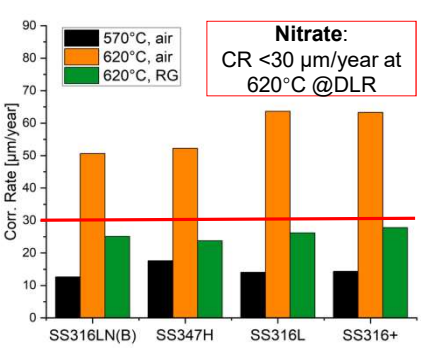


High precision salt analysis for service life monitoring (e.g., corrosivity of salt towards steel)

DLR Expertise and Achievements in Molten Salts

100 tones molten salt TESIS facility

https://doi.org/10.1016/j.apenergy.2022.119708



https://doi.org/10.1016/j.corsci.2023.111700

- Continuous operation of DLR TESIS facility with approx. 100 tones of nitrate salt @560°C since Jan. 2019
- Successful corrosion control of commercial nitrate (620°C) and chloride (700°C) salts with DLR solutions

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