Open-source Alloy selection and Lifetime assessment tool for structural components in CSP - 37370

Beyond metals loss: the hidden corrosion induced degradation aspects

1. Impact
   - >30% reduction in development costs
   - 50% reduction in development time for CSP technologies
   - Accurate information on materials compatibility issues in CSP applications

2. Project Goal
   - Develop one of a kind material evaluation tool to predict mechanical and corrosion behavior of candidate materials for molten salt\'s\text{\textsubscript{\text{SC}}}2\text{\textsubscript{\text{O}}2} heat exchangers.

3. Method(s)
   - Compile existing creep + corrosion data for candidate materials: 740H, 282 and 625
   - Physics-based models to predict impact of creep-corrosion interactions on lifetimes

4. Outcomes
   - Successfully integrated underlying physics of creep-corrosion induced degradation processes in s\text{\textsubscript{\text{CO}}2}/molten chloride salts
   - Rapid evaluation of material behavior under specified operating conditions

5. Conclusion/Risks
   - Enhance tool to address additional degradation mechanisms and materials

6. Team
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Figure 1. Model capable of predicting creep-corrosion interactions on degradation of Ni-based alloys during operation in s\text{\textsubscript{\text{CO}}2} and molten chloride salts