

**MATERIALS ENGINEERING
SEMINAR**

**“Understanding Mechanistic Effect of Chloride-induced Stress Corrosion Cracking Mechanism
Through Multi-scale Characterization”**

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Purdue MSE Ph.D. Final Exam

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ABSTRACT

Stress corrosion cracking (SCC) is a longstanding critical materials challenge in austenitic stainless steels (AuSS). Recently, there has been mounting concern regarding the potential for Chloride-induced stress corrosion cracking (CISCC) along arc weld seams on austenitic stainless-steel canisters used as spent nuclear fuel (SNF) dry storage containers, due to the residual stress from the welding process and exposure to chloride-rich coastal air at storage sites. To ensure the safety of the SNF storage, prevention and mitigation of CISCC are critical in both engineering design and maintenance of the storage canisters before and after their deployment. Two routes to tackle this challenge will be presented in this talk. The first is further understanding the propagation of transgranular CISCC in AuSS, especially from the mechanistic and microstructural perspectives, through the combination of finite element analysis (FEA), high-resolution transmission electron microscopy (HRTEM), and statistical analysis on a large set of electron backscattered diffraction (EBSD) results. The second route is investigating the mitigation effectiveness and degradation mechanism of cold spray coating as a novel CISCC repair technique. Results from both routes provide insights on the fundamental CISCC mechanism and guidance on effective mitigation methods for SNF storage canisters.

Date: Wednesday, April 12, 2023

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Place: Webex-

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