



Department of Materials Science and Engineering Seminar Series 2025

MODELLING OF LOCALISED CORROSION

Gao Ya

Date and time: 17 August 2026 (Monday), 2-4pm

Venue: E4-04-05 - E-Cube 1

Abstract

Localised corrosion is a major form of material degradation involving complex interactions between electrochemical reactions, mass transport, and local electrolyte chemistry. This research develops numerical models with COMSOL Multiphysics to investigate the mechanisms governing localised corrosion, with a primary focus on crevice corrosion. Using the finite element method, the models couple electrochemical kinetics with species transport to simulate changes in the local chemical and electrochemical environment. The effects of crevice geometry on dissolved oxygen, metal and chloride ion concentrations, pH, and corrosion rate are investigated. An Evans droplet model is also developed to examine differential aeration corrosion and provide complementary insights into localised corrosion mechanisms. The results demonstrate the capability of numerical modelling to capture the coupled processes governing localised corrosion and provide insights into the influence of geometry and local environmental conditions on corrosion development.

Biography

Gao Ya received her B.Sc. from the National University of Singapore (NUS) and is currently a Ph.D. candidate in the Department of Materials Science and Engineering at NUS under the supervision of A./Prof. Dnaiel J. Blackwood. Her research focuses on the numerical modelling of localised corrosion.

Please join us!

HOST: Asst Prof Jing Yan