

## NOMATEN Hybrid Seminar

**Location:** NOMATEN seminar room

**Time:** 1 PM

**gotomeeting room (for online):** <https://meet.goto.com/NCBJmeetings/nomaten-seminar>

**Seminar date:** January 9th, 2024

**Title:** The application of flow cells and computational fluid dynamics for improved corrosion and electrochemical analysis

**Speaker name:** Prof. Joshua Owen

**Speaker affiliation:** University of Leeds, Leeds, United Kingdom

**Abstract:** Hydrodynamics can play a critical role in the degradation of materials, often defining the rates and mechanisms by which metals corrode. To improve the understanding of the relationship between fluid flow and corrosion, precise and well characterised experimental techniques are required. The application of fluidic cells to enhance the study of electrochemical behaviour is becoming increasingly popular across a variety of research fields, due to high precision control over the flow behaviour. When applied in corrosion study, these techniques enable high precision control of flow rates, mass transport and the surface chemistry at the metal-electrolyte interface. When combined with computational fluid dynamics (CFD) simulations, the corrosive environment is well defined, enabling a direct relationship between fluid flow and corrosion rates to be established. During this talk, an overview of how these techniques have been implemented will be provided. High precision flow cells have been used to establish mechanisms of corrosion product layer formation, while CFD has enabled prediction of corrosion rates in complex geometry flows.

**Bio:** Dr Joshua Owen is a Lecturer in the School of Mechanical Engineering at the University of Leeds, with research expertise in corrosion science, electrochemistry and the application of computational fluid dynamics to simulate fluid flow and corrosion behaviour. Dr Owen was awarded a PhD from University of Leeds in 2018 focused on advancing the understanding of erosion-corrosion of carbon steel using a combined experimental approach with CFD predictions of turbulent flow, mass transfer and solid particle transport. Dr Owen has >25 publications in the field of corrosion and has ongoing research projects to investigate corrosion behaviour of engineering metals in renewable energy environments.