



## Chemistry Departmental Seminar

Monday, August 12, 2024 at 1:00 p.m. (Room: CSF-1302)

# **Coatings for pipeline corrosion prevention: A review of research over the past two decades**

Dr. Frank Cheng

*Professor, University of Calgary*

External corrosion is one of the primary mechanisms resulting in pipeline failures. Statistics showed that, of the various reasons causing failures of long-distance transmission pipelines in Canada, nearly 57% of all failure events are associated with the occurrence of external corrosion. Pipeline external corrosion is a complex phenomenon, and the complexity arises from the fact that numerous factors affecting the corrosion processes have interrelated each other. Particularly, these factors are related to coatings and their performance, cathodic protection and the service environments.

This talk includes the author's research experiences in relevant areas in the last two decades. Starting from the principle for pipeline external corrosion prevention and the main coatings used today, the talk then examines the coating failure modes and effect analysis, especially the coating performance in conjunction with cathodic protection. After introducing the testing methods for coating performance evaluation in both laboratory (for academic research) and the field (for practical applications), the talk also covers some functional coatings for smart corrosion sensing, anticorrosion and antibiofouling, as well as erosion-resistant coatings. The talk concludes by offering insights into the practical requirements for high-performance coatings for effective corrosion control.

## Bio – Dr. Frank Cheng



Dr. Frank Cheng is a Professor and Canada Research Chair in Pipeline Engineering at the University of Calgary. He serves the Director in Advanced Materials & Manufacturing in the Schulich School of Engineering. Frank is an internationally recognized leader in energy pipeline research, with specializations in corrosion, stress corrosion cracking, hydrogen pipeline technology, and CO<sub>2</sub> pipelines and geological storage. He has authored 4 influential books and over 300 journal papers. The total citations of his publications are nearly 19,000 and the H-index is 82.

Frank was named the Canadian Distinguished Materials Scientists in 2019. He was elected as a Fellow of the Royal Society of Canada (RSC) in 2023, and the Canadian Academy of Engineering (CAE) in 2024. Frank has received numerous awards from international associations and leading agencies in recognition of his contributions to the fields of corrosion science and pipeline engineering. He is a Fellow of NACE, ICorr, CSCP, IMMM, and IAAM. Frank serves as the Editor-in-Chief of the *Journal of Pipeline Science and Engineering* (Elsevier). Frank obtained his Ph.D. in Materials Engineering from the University of Alberta in 1999.