Exponent®
Engineering & Scientific Consulting

Negar Moradighadi, Ph.D.

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Professional Profile

Dr. Moradighadi's has expertise in electrochemistry and metallic corrosion. Her skill set encompasses a wide range of corrosion testing techniques, including potentiodynamic polarization, electrochemical impedance spectroscopy (EIS), linear polarization resistance (LPR), and weight loss measurement. Additionally, she has conducted research in characterizing surfactants as corrosion inhibitors, employing methods such as surface tension measurement and fluorescence spectroscopy. Her proficiency extends to metallurgy and material characterization, encompassing metallography, mechanical testing, and advanced microscopic techniques, such as optical microscopy (OM), scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDS), and infinite focus microscopy (IFM). In her recent endeavors, she has conducted corrosion assessments for medical devices, evaluated pipeline integrity, guided clients in evaluating the susceptibility of battery components to corrosive environments, provided insights into anodized aluminum choices, and supported clients in litigation and arbitration cases.

Before joining Exponent, Dr. Moradighadi completed her Ph.D. in Chemical Engineering at the Institute for Corrosion and Multiphase Technology at Ohio University. During her academic journey, she applied electrochemical techniques to study the mechanism of electrochemical reactions associated with the internal corrosion of oil and gas pipelines. She made extensive use of EIS to investigate multi-step reactions, adsorbed species, and determine the kinetic rate constants of reactions involved in iron dissolution within aqueous acidic environments. Notably, her contributions extended to enhancing an existing corrosion prediction software package, vital for addressing internal corrosion challenges in the oil and gas pipeline sector.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Ohio University, 2022

B.Sc., Metallurgy & Material Engineering, Iran University of Science and Technology, 2014

Licenses and Certifications

Professional Engineer Chemical, California, #7222

Publications

Journal Publications

Moradighadi N, Nesic S, Tribollet B. Identifying the dominant electrochemical reaction in electrochemical impedance spectroscopy. Electrochimica Acta 2021; 400:139460.

Moradighadi N, Lewis S, Olivo JD, Young D, Brown B, Nesic S. Determining critical micelle concentration of organic corrosion inhibitors and its effectiveness in corrosion mitigation. Corrosion 2021; 77(3):266-275. (Recognized by an editor's choice open access article)

Premadasa UI, Moradighadi N, Kotturi K, Nonkumwong J, Khan MR, Singer M, Masson E, Cimatu KL. Solvent isotopic effects on a surfactant headgroup at the air–liquid interface. The Journal of Physical Chemistry C 2018;122(28):16079-16085.

Conference Proceedings

Moradighadi N, Choi Y.S., Nesic S. Mechanistic modeling of the impedance response of cathodic reduction of hydrogen ion in strong acidic environments. AMPP Annual Conference 2022; 17900.

Moradighadi N, Brown B, Nesic S. Note on selecting DC potentials for EIS measurements: an example of determining the diffusion coefficient of hydrogen ion in aqueous solutions. AMPP Annual Conference 2021; 16753.

Moradighadi N, Lewis S, Domínguez Olivo J.M., Young D, Brown B, Nesic S. Effect of alkyl tail length on CMC and mitigation efficiency using model quaternary ammonium corrosion inhibitors. CORROSION Conference 2019; 13004.

Belarbi Z, George B, Moradighadi N, Young D, Nesic S, Singer M, Nogueira R. P. Volatile corrosion inhibitor for prevention of black powder in sales gas pipelines. CORROSION Conference 2018; 10962

Conference Presentations

Moradighadi N, Choi Y.S., Nesic S. Mechanistic modeling of the impedance response of cathodic reduction of hydrogen ion in strong acidic environments. AMPP Annual Conference, San Antonio, TX, 2022.

Moradighadi N, Brown B, Nesic S. Note on selecting DC potentials for EIS measurements: an example of determining the diffusion coefficient of hydrogen ion in aqueous solutions. AMPP Annual Conference, virtual, 2021.

Moradighadi N, Lewis S, Domínguez Olivo J.M., Young D, Brown B, Nesic S. Effect of alkyl tail length on CMC and mitigation efficiency using model quaternary ammonium corrosion inhibitors. CORROSION Conference, Phoenix, AZ, 2019.

Posters

Moradighadi N, A new methodology for determining the DC potentials for EIS measurement. Poster presentation, AMPP Annual Conference, virtual, 2021.

Moradighadi N, Effect of alkyl tail length and concentration on the adsorption of corrosion inhibitors. Poster presentation, CORROSION Conference, Phoenix, AZ, 2019.

Moradighadi N, Mitigation of black powder formation in sales gas pipelines by volatile corrosion inhibitors. Poster presentation, CORROSION Conference, Nashville, TN, 2018.

Project Experience

Conducted corrosion assessments for medical devices. Evaluated the corrosion and structural integrity of pipelines. Provided guidance to clients in evaluating the vulnerability of battery components to corrosive

components. Equipped clients with knowledge about the distinctive features of anodized aluminum candidates, enabling them to make educated decisions. Supported clients in litigations and arbitrations.