

Tuesday December 8 2020, from 14:30-15:30, European MIC Network proudly presents

Laboratory testing of biocides simulating field conditions

Susmitha Purnima Kotu, Christopher Kagarise, and Rick Eckert
Corrosion Management, Pipeline Services, DNV GL

Biocides are frequently used for mitigating microbiologically influenced corrosion (MIC). Biocide screening studies are commonly performed using culture-based kill studies on planktonic samples consisting of field waters or specific species of microorganisms associated with MIC. However, MIC is most influenced by microorganisms that exist in biofilms on surfaces and the response of biofilms to biocides can be significantly different from the response of planktonic bacteria. This presentation aims to highlight the importance of moving beyond planktonic and culture-based kill studies for characterizing the effectiveness of biocides in mitigating MIC to using biofilms grown from field waters, determining the effects on microorganisms using molecular microbiological methods (MMM) techniques, and measuring changes in corrosion rates. Different considerations for conducting these laboratory experiments such as length of testing, experiment set up, replication of field conditions etc., pose challenges experimental design and interpretation of results to translate to field application. There is currently no industry standard that provides guidance on such testing and this gap is addressed by NACE TM21495, formerly TG 586, Laboratory evaluation of the effect of biocides on biofilms and microbiologically influenced corrosion (MIC).



Dr. Susmitha Purnima Kotu is an engineer in the corrosion management group with expertise in microbiologically influenced corrosion (MIC) at DNV GL in Columbus OH, USA. Dr. Kotu received her Ph.D. in Chemical Engineering along with Safety Engineering certification from Texas A&M University. Before joining DNV GL, Dr. Kotu worked as an intern in the corrosion labs at ExxonMobil Upstream Research Company and Baker Hughes, a GE company. In her current role, she supports internal corrosion projects with a focus on MIC and microbiology services including MIC threat assessments and biocide screening and optimization. She has published several peer-reviewed journal articles and was awarded a patent in the field of MIC. She has also instructed a course on “Introduction to MIC” at Appalachian Underground Short Course in May 2019 and was an invited speaker for Corrosion and Materials Reliability Symposium organized by NACE Texas A&M University student section in Oct 2019. She serves as a reviewer for scientific articles published in several international journals and NACE CORROSION symposia.



Dr. Christopher Kagarise is a Senior Engineer in the Corrosion Management group at DNV GL in Dublin, Ohio. Much of his work is directed toward helping oil and gas operators improve the management of internal corrosion in their pipelines and facilities piping. His work has included reviewing and developing internal corrosion management programs, performing corrosion monitoring using extended analysis coupons, developing methods to characterize corrosion on coupons using 3-dimensional surface profilometry, and evaluating the effects of biocides on biofilms. Prior to joining DNV GL he obtained a Bachelor’s degree in Chemical Engineering from the University of Toledo and a Ph.D. in Chemical Engineering from The Ohio State University with a research focus on the effects of nanoparticles on the flow behaviors of various polymers and fluids.