TEXAS A&M UNIVERSITY at QATAR

Chemical Engineering Program

CORROSION ISSUES IN THE OIL & GAS INDUSTRY

Prof. Brajendra Mishra

December 08, 12-01PM
Lecture Hall 144
(Pizza will be served)

Recent advances made in the study of various corrosion issues that are affecting the oil and gas industry will be presented. Stress Corrosion Cracking of API G-105 Grade Drill Pipe Steel at 125-175 °C in CO2 Containing Environment has been studied. Corrosion film formation and its morphology on the steel surface were investigated using X-ray diffraction (XRD), and scanning electron microscopy (SEM). Results showed occurrence of SCC at temperatures 125-175^{0}C and increasing temperature increased the loss of ductility; also, the depth and size of the cracks increased with temperature. SEM studies showed formation of a rhombohedric crystalline film on the surface at temperatures 100 ^{0}C and above while this layer was not formed at temperatures 75^{0}C and below.

Corrosion of supermartensitic stainless steels under alternating current in artificial seawater has been investigated. EIS was successfully used to compare the thickness of the corrosion products formed during the application of different alternating current (AC) densities as well as to characterize pitting. When EIS is applied at the open circuit potential, the technique is nondestructive and predicts the corrosion behavior of the electrode. It can also be used at cathodic potentials while still being nondestructive, providing information about the electrode reaction kinetics, diffusion and electrical double layer.

Influence of Sulfate Reducing Bacteria Metabolic Reactions on the Corrosion Behavior of API-5L X65 Carbon Steel Pipeline has been observed. Microbiologically influenced corrosion (MIC) by Sulfate Reducing Bacteria (SRB), *Desulfovibrio africanus sp*, on API-5L grade X65 carbon steel was investigated. The corrosion behavior was characterized by Electrochemical Impedance Spectroscopy (EIS), linear polarization resistance (Rp) and open circuit potential (OCP). EIS spectra displayed one time constants for the sterilized growth media. Conversely, one time constant with a finite Warburg element were observed in the SRB cultured media. The SRB Bio-catalytic activities promote the corrosion rate via formation of biofilm, production of hydrogen sulfide and biotic reduction of phosphates and subsequent formation of iron phosphide.

Prof. Brajendra Mishra

Dr. Brajendra Mishra is a professor of Metallurgical & Materials Engineering at the Colorado School of Mines. Dr. Mishra is the Co-Director of the National Science Foundation's Industry/University Collaborative Research Center on Resource Recovery & Recycling – the first National Center of its kind. Brajendra received his Bachelor of Technology [1981] degree in Metallurgical Engineering from the Indian Institute of Technology in Kharagpur, India and his M.S. [1983] and Ph.D. [1986] in Materials Science from the University of Minnesota in Minneapolis. Prof. Mishra is also the Assoc. Director of Kroll Institute for Extractive Metallurgy. Dr. Mishra served as a Distinguished Chair Professor of Chemical Engineering at the Petroleum Institute in Abu Dhabi for six months.

Dr. Mishra has authored over 400 technical publications in refereed journals and conference proceedings. He holds six patents and has authored/edited 19 books. Dr. Mishra is a member of TMS, ASM International, NACE and Electrochemical Society. He is a Fellow of ASM (2001). Mishra received the Distinguished Service Award from the Minerals Metals & Materials Society (2010) and the highest award of Honorary Membership form the Indian Institute of Metals (2008). Brajendra served as the 2006 President of The Mineral, Metals & Materials Society (TMS) of AIME and now is the President of Amer. Institute of Mining, Metallurgical & Petroleum Engineers.

FOR MORE INFORMATION:

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