

Tuesday, 6th October 2020, from 14:30-15:30, European MIC Network proudly presents

Investigation of microbial souring mechanisms and testing natural antibiotics for prevention of microbiologically influenced corrosion (MIC)

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Offshore oil production facilities are subjectable to internal corrosion, which can occur through microbiologically influenced corrosion (MIC) and souring (sulphide production by sulfate-reducing prokaryotes, SRP). Seawater contains sulfate (up to 25-30 mM in the North Sea), thus allowing prominent SRP; sulphate-reducing bacteria (SRB), sulphate-reducing archaea (SRA) and methanogens to attack as an embedded matrix (often with bioinorganic matrixes) referred to as biofilms. The petroleum industry relies on biocides to avoid MIC, souring and biofouling.

Active phytochemicals including strong antimicrobials from halophytes have been investigated to combat contamination by inhibiting MIC promoting microorganisms such as methanogens and SRP. A bioreactor system for biofilm production was inoculated biofilm samples to emulated onsite MIC. Next generation sequencing (NGS) of DNA from bacteria helped identify the strains and study the effects of natural antimicrobials on these strains. The inhibitory effect of using selected plant-based extracts on SRB, SRA and methanogens resulted in inhibition of MIC in liquid samples from the reactors treated with plant-based extractive mix. Biofilm formation was reduced by three times on carbon steel and four times on stainless steel coupons in reactors treated with plant-based extractive mix. Visible and measurable reduction in pitting and corrosion damages on carbon steel coupons was observed with the help of 3D surface scanning. Use of natural antibiotics resulted in inhibiting the growth of SRP. Long-term solutions to prevent MIC and souring using natural antibiotics are currently being investigated.

Dr. Tanmay Chaturvedi

- Received his Ph.D. in Chemical and Environmental Engineering
- His dissertation focused on process design, economics, and policies for biorefineries
- Currently, his research focuses on inhibiting microbiologically influenced corrosion using plant-based natural antibiotics

