Contribution ID: **8** Type: **Poster**

Does surface energy have effect on SRB biofilm formation?

Wednesday, May 11, 2022 3:56 PM (1 minute)

Sulfate-reducing bacteria (SRB) have a unique ability to grow under anaerobic conditions using sulfate as a terminal electron acceptor, reducing it to hydrogen sulfide. SRB thrives in many natural environments, deep subsurface environments, and processing facilities in an industrial setting. considering to their ability to alter the physicochemical properties of underlying metals, SRB can induce fouling, corrosion, and pipeline clogging challenges. The biocorrosion cost a loss of about 3Billion USD to every year to USA. To effectively combat the challenges posed by SRB, it is essential to understand their molecular mechanisms of biofilm formation and corresponding biocorrosion. Identification of processes and mechanisms working in biofilm will lead us to design a next-generation metal which will not allow biofilm formation and ultimately save the resources. We hypothesize that variation in atomic lattice orientation and physical grains and grains boundaries corresponds to different surface energy and that may have effect on bacterial attachment for biofilm formation. To understand the interaction between metal surface and bacteria during initial attachment and biofilm formation. We have designed an experiment with three different type of surfaces viz; Annealed copper, Glass and Carbon steel and a SRB strain Desulfovibrio alaskensis G20. Anaerobic bioreactor (CDC-Bioreactor) was used for setup and incubated for 7 days in an anaerobic chamber at 30 ℃. Biofilm was harvested and analyzed for Confocal laser microscopy and qPCR to observe the effect on biofilm and regulatory mechanisms of biofilm formation respectively. Results of first observance confirm that carbon steel surface has good biofilm followed by annealed copper and glass surface has least biofilm. The same was also validated with confocal laser microscopy. qPCr analysis also support the hypothesis and resulted in higher expression of regulatory gene (σ54 Factor), periplasmic transporter gene (LuxP) and energy metabolic gene (dsrA). With these positive results we could conclude that surfaces with high energy have better biofilm growth and may have higher biocorrosion. The study need to be further performed extensively with many more combination of metal surfaces and different types of same metal to make a concrete conclusion.

Primary author: Dr SINGH, Ram (Department of Chemical and Biological Engineering, South Dakota School of Mines and Technology)

Co-authors: Mr KANDADAI, Anantha (South Dakota School of Mines and Technology); Dr GOPALAKRISHNAN, Vinoj (South Dakota School of Mines and Technology); Dr JASTHI, Bharat.Jasthi@sdsmt.edu (South Dakota School of Mines and Technology); Prof. SANI, Rajesh (South Dakota School of Mines and Technology)

Presenter: Dr SINGH, Ram (Department of Chemical and Biological Engineering, South Dakota School of Mines and Technology)

Session Classification: Poster Session

Track Classification: Biology