

## Selección de materiales en el upstream y downstream

### **BACTERIAL ADHERENCE ON POLYMERIC COATINGS APPLIED ON CARBON STEEL**

Sandro Nicolino<sup>1</sup>, Monica Zapponi<sup>1</sup>, Sonia Bruno<sup>1</sup>, Verónica Rodríguez Bauzada<sup>1</sup>, Pablo Castro<sup>1</sup>. Marisa R. Viera<sup>2,3</sup>, Silvia E. Rastelli<sup>2,4</sup>, Sandra G. Gomez De Saravia<sup>2,4</sup>, Cecilia I. Elsner<sup>2,5</sup>, Alejandro R. Di Sarli<sup>2</sup>, Mauro Banera<sup>2,5</sup>

<sup>1</sup>Tenaris, <sup>2</sup>Centro de Investigación y Desarrollo en Tecnología de Pinturas (CIDEPINT), CICPBA-CONICET-UNLP, Avenida 52 s/n e/ 121 y 122, CP 1900, La Plata Buenos Aires, Argentina. <sup>3</sup>Facultad de Ciencias Exactas, UNLP; <sup>4</sup>Facultad de Ciencias Naturales y Museo, UNLP; <sup>5</sup>Facultad de Ingeniería, UNLP. [mnicolino@tenaris.com](mailto:mnicolino@tenaris.com); [mzapponi@tenaris.com](mailto:mzapponi@tenaris.com); [sbruno@tenaris.com](mailto:sbruno@tenaris.com); [verrodriguez@tenaris.com](mailto:verrodriguez@tenaris.com); [pcastro@tenaris.com](mailto:pcastro@tenaris.com); [m.viera@cidepint.ing.unlp.edu.ar](mailto:m.viera@cidepint.ing.unlp.edu.ar); [e.rastelli@cidepint.ing.unlp.edu.ar](mailto:e.rastelli@cidepint.ing.unlp.edu.ar); [s.gomez@cidepint.ing.unlp.edu.ar](mailto:s.gomez@cidepint.ing.unlp.edu.ar); [c.elsner@cidepint.ing.unlp.edu.ar](mailto:c.elsner@cidepint.ing.unlp.edu.ar); [a.disarli@cidepint.ing.unlp.edu.ar](mailto:a.disarli@cidepint.ing.unlp.edu.ar); [m.banera@cidepint.ing.unlp.edu.ar](mailto:m.banera@cidepint.ing.unlp.edu.ar).

### Abstract

Microbial contamination in the oil and gas industry results in a variety of problems in drilling fluids, hydraulic fracturing fluids, water flooding, pipelines, and storage tanks. Microorganisms such as sulfate-reducing bacteria (SRB), acid producing bacteria, and/or other halophiles can negatively impact asset integrity and reduce the quality and quantity of produced hydrocarbons. Organic coatings are used on the internal tube surface to prevent corrosion problems in service. The aim of this study was to evaluate the performance of polymeric coatings applied on carbon steel in the presence of a microbial consortium from an oil storage tank. The samples were exposed to a batch culture of the microbial community in Postgate's C medium in anaerobic conditions at  $28 \pm 2$  °C for 60 days. After that time, different techniques were applied to analyze surface deterioration: Scanning Electron Microscopy (SEM), Electrochemical Impedance Spectroscopy (EIS), Epifluorescence Microscopy (EM). Furthermore, the planktonic and sessile microbial communities were analyzed by Next-Generation Sequencing (NGS) of 16S rRNA gene. The genetic analysis showed a shift in the bacterial community along the experiment. SRB were predominant at the beginning, diminishing their number with time. Bacteria belonging to the Desulfovibrionales and Bacteroidales orders were the most abundant in the biofilms formed on the samples. According to the EIS results, neither deterioration of the coating, nor corrosion of the carbon steel was detected after the exposure to the cultures for 60 days.