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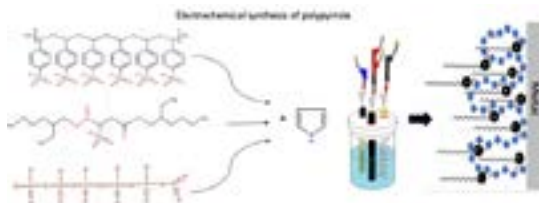
Electrochemistry

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Development of electrochemical coatings based on polypyrrole doped with bulky anions and evaluation of their anticorrosive protection of 1020 steel

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Mild steels are widely used in structural applications. However, they are susceptible to chemical attack and therefore deteriorate when exposed to corrosive environments. Traditionally, chromate based coatings have been employed to inhibit steel corrosion, but these compounds are highly toxic and environmentally dangerous¹. Intrinsic conducting polymers (PCIs)₂ have emerged as an alternative to chromates as corrosion inhibitors or protective films. Among them, polypyrrole (PPy) has attractive properties as the ease of synthesis, chemical stability, low toxicity, biocompatibility and high electrical conductivity^{4,5}. In this work, three different anions, sodium polystyrene sulfonate (PSS), sodium bis (2-ethylhexyl) sulfosuccinate (BEHSS) and sodium polyphosphate (PF), were used as dopants in the electrosynthesis of PPy polymers. Potentiodynamic, potentiostatic and galvanostatic electropolymerization methods were compared. The performance of these polymers as protective films of 1020 carbon steel was evaluated by Tafel polarization curves, open circuit potential (OCP) and electrochemical impedance spectroscopy (EIS). Polyphosphate-doped polypyrrole obtained by potentiostatic method, showed the highest adhesion to the metal surface as well as the best protection against corrosion.



Recent Publications

1. Costa, M. Toxicol. Appl. Pharmacol. 2003, 188, 1-5.
2. Inzelt, G. Conducting polymers: a new era in electrochemistry; 2012.
3. Sazou, P. P. D. y D. Corrosion Protection of Metals by Intrinsically Conducting Polymers; Taylor & Francis Group: Boca Raton, FL, 2016.
4. El Jaouhari, A., et al. "Corrosion resistance and antibacterial activity of electrosynthesized polypyrrole." Synthetic Metals 226 2017, 15-24.
5. Naghavi Alhosseini, Sanaz, et al. "Improved cellular response on functionalized polypyrrole interfaces." Journal of cellular physiology 2019.

Biography

Williams Orlando Gómez, Romero studied chemistry at Universidad Nacional de Colombia. He worked in the industry in research and development for the oil, mining and environmental sectors. Then He did master studies in teaching chemistry at Universidad pedagogica Nacional. Currently he is studying his PhD in chemistry at Universidad de los Andes, in the group of electrochemistry and polymeric materials of the chemistry department. His research interests are two topics polymers and corrosion. His thesis is focused on the synthesis of a polypyrrole conducting polymer and its application as a corrosion inhibitor of carbon steel.