Corrosion Inhibition of AA2024-T3 Using Anodic Films Containing Tannic Acid and Gallic Acid

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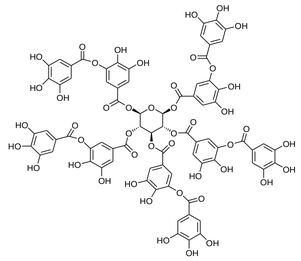
Pre-treatment of AA2024-T3 aluminium alloy to protect it from corrosion involves formulations containing chromium (VI) . However, REACH restricts the use of hexavalent chromium in EU, due to the negative impact of these compounds in environment and human health. In recent years the scientific community has been looking for new corrosion protection alternatives, that could be efficient and more environmentally and human-friendly, to replace the chromium (VI) based treatments.

Our groups had been looking for inhibition corrosion materials obtained from vegetable sustainable sources. The conversion coatings formed on the aluminium alloy using several natural compounds obtained from the barks or leaves of some brushes and trees revealed that the use of these phytochemicals despite the differences in their chemical structures, provide a good corrosion protection, making this pre-treatment a promising alternative for chromium (VI) based chemical conversion. In this work the anodizing treatment was performed in diluted sulphuric acid electrolyte with tannic acid (TNSA) or gallic acid (GSA) . The potentiodynamic polarization and the electrochemical impedance spectroscopy (EIS) were performed to verify the corrosion resistance of the treated samples. The cyclic voltammetry showed the influence of the intermetallics. The Scanning Electron Microscopy (SEM) was employed to analyse the morphology of the coatings. Characterization of obtained anodic films formed was done by Fourier Transform Infrared Spectroscopy (FTIR).

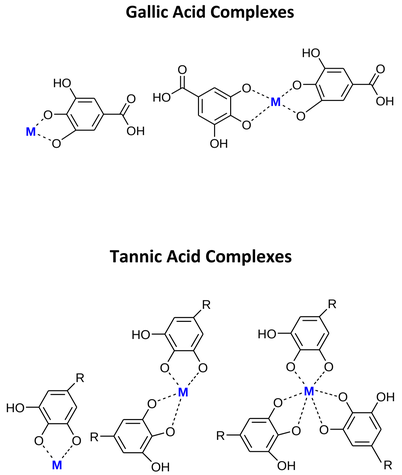
The conversion coatings formed on the aluminium alloys revealed a good corrosion protection, making this pre-treatment a promising alternative for chromium (VI) based ones.

Chemical structures of phytochemicals

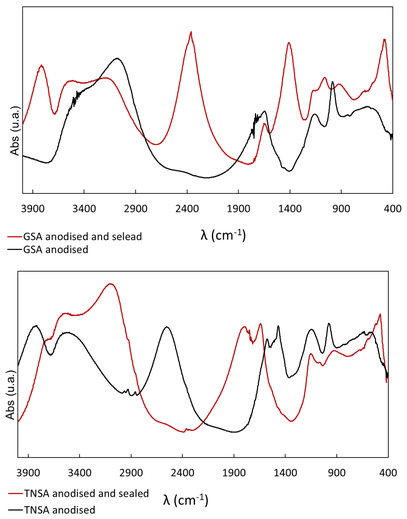


tannic acid.

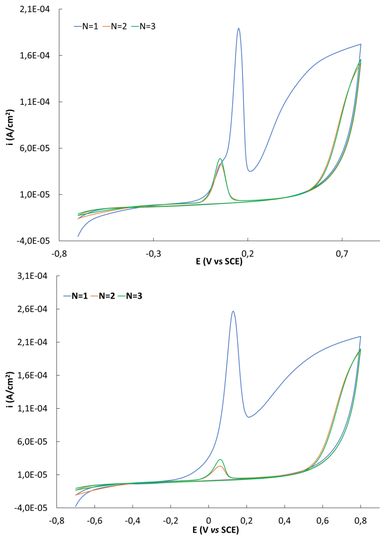
gallic acid



FTIR spectra



Cyclic voltammograms



Acknowledgements

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