

Synthesis of Based-Graphene Polyurethane and Its Evaluation as Anticorrosive Coating

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Abstract

In this work, graphene oxides (GO) with different oxidation degrees were obtained. GOs were utilized as polyol in the polymerization reaction with diphenylmethane dissociacyanate (MDI) in order to obtain based-graphene polyurethane (G-PU) [1]. The presence of hydroxyl functional groups in GOs allows in order to generate urethane covalent bonds and give rise to G-PU. G-PU obtained were characterized by FTIR, FTIR-spectra show the characteristic bands of this polymer, specially, it is observed the bands at 1640 cm^{-1} and 3300 cm^{-1} corresponding to vibrational stretch tension of O-C=O and N-H bonds, respectively [2]. Coating of different thickness of G-PU were put on surface of coupons of low carbon steel (SAE1020). The mechanical properties of the coating were evaluated, finding abrasion index values of 20.72 and adhesion values above 2500 psi. Contact angle measurement presented an average value of $124.6\pm 4.5^\circ$, revealing the hydrophobic character of the G-PU. Additionally, its value of electrochemical impedance ($4.46\times 10^8\ \Omega/\text{cm}^2$) did not vary significantly for a period of 69 days [3]. G-PU present an efficient barrier effect due to its lamellar structure (DRX and SEM). Finally, the evaluated properties correspond to a material with good anticorrosive protection (figure 1), with possible application as a protective coating in infrastructure exposed to saline environments.

References

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Figures

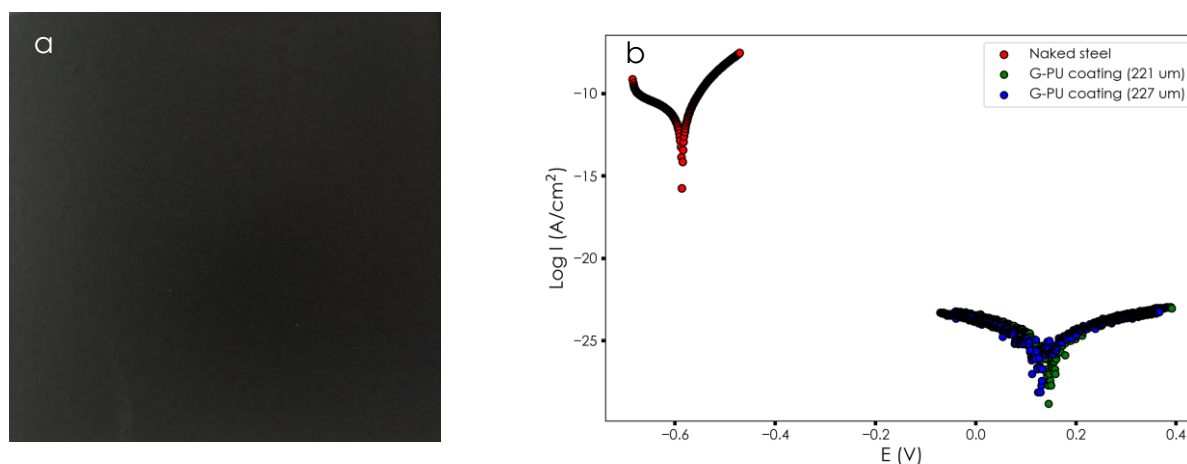


Figure 1: a) G-PU Coating on steel SAE1020; b) Polarization curves for naked Steel (red), Steel with G-PU coating of 221 μm of thickness (green) and Steel with G-PU coating of 227 μm of thickness (blue)