SMART POLYANILINE ACRYLIC BLENDS COATINGS FOR CORROSION PROTECTION

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Smart overlay coating strategies for corrosion protection are being developed to provide a specific protection when damage is produced on the protective layer [1-3]. The interest to provide new protection systems to aluminum super alloy and other metals as iron is related to the restrictions to the use of heavy metals due to their environmental problems. Kinlen et al. [4] have provided direct information of the redox processes occurring in the polymeric layer by Scanning Reference Electrode technique (SRET), and Souza et al. [5] have obtained information not only about the redox processes between polyaniline and iron, but also they have identified the formation of a second protective layer between the metal cation and the dopant-anion of the polymer.

This work presents the electrochemical behavior of an acrylic blend formed by camphorsulfonate-doped polyaniline and poly(methyl methacrylate) used for corrosion protection of A2024 aluminum alloy and iron in sulfuric acid solutions. Scanning electrochemical microscopy was used to follow the dynamics of the re-pasivation layer formed on the bare surface produced by an intentional scratch. The chemical nature of this new passive layer was determined by using Raman spectroscopy. Results indicate that these blends act by a double protection mechanism: forming a passivating complex with the dopant anion (camphorsulfonate) on the naked alloy surface in the scratch and acting as an active barrier when it is deposited as a coat on the surface. This active behavior is associated to the redox reaction between Al and polyaniline.

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References

1. C. Y. Yang, Y. Cao, P. Smith, A. J. Heeger, Synth Met. 53 (1993) 293.
2. Y. Cao, A. J. Heeger, Synth Met. 52 (1992) 193.
3. C. O. Yoon, M. Reghu, D. Moses, A. J. Heeger, Y. Cao, Phys Rev. B 48 (1993) 14080.
4. P. J. Kinlen, Y. Ding, D. C. Silverman, Corrosion 58 (2002) 490.
5. S. De Souza, J. E. Pereira Da Silva, S. I. Córdoba de Torresi, M. L. A. Temperini, R. M. Torresi, Electrochem. Solid State Lett. 4 (2001) B27.

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