Implementation of superhydrophobic PS electrospun nano/microfibers for corrosion protection of aluminum substrates

A. Iribarren, P.J. Rivero, C. Berlanga, J.F. Palacio, S. Larumbe, J. Goicoechea and R. Rodríguez

Engineering Department and Institute for Advanced Materials (InaMat), Public University of Navarra. Campus Arrosadia S/N, 31006, Pamplona, Spain
Centre of Advanced Surface Engineering, AIN, 31191, Cordovilla, Spain
Iribarren.111228@e.unavarra.es

ABSTRACT

In this work, the electrospinning technique is used for the synthesis of micro/nanofibers using a polymeric precursor with hydrophobic (even superhydrophobic) behaviour such as polystyrene (PS). These electrospun fibers are deposited onto aluminum substrates (6061T6). The effect of varying the different electrospinning deposition parameters (mostly applied voltage and flow-rate) will be exhaustively analyzed in order to optimize the resultant electrospun coatings. Several fiber characterization tests have been performed, including Field Emission Scanning Electron Microscopy (FE-SEM), Atomic Force Microscopy (AFM), Termogravimetric analysis (TGA), Optical Microscopy (OM) and Water Contact Angle (WCA) measurements. Furthermore, the anti-corrosion properties of these electrospun coatings can be enhanced by the addition of metal oxide nanoparticles (ZnO) which act as corrosion inhibitors. Finally, electrochemical corrosion tests (Tafel and pitting tests) have been performed, showing an improvement in the resultant corrosion resistance of the aluminum alloys coated by the combination of both polymeric film with metal oxide inorganic nanoparticles.

RESULTS AND DISCUSSION

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REFERENCES

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