

Assessment of corrosion protection and performance of bio-based polyurethane acrylate incorporated with nano zinc oxide coating

ABSTRACT

In this study, a series of UV-curable anticorrosive PUA coatings embedded with varying concentrations of inorganic ZnO fillers have been successfully prepared from jatropha-based polyol. The electrochemical impedance spectroscopy (EIS) and Tafel polarisation analysis revealed that increasing fillers composition lead to the improvement of the anticorrosive property of the hybrid coatings. Meanwhile, the salt spray test results were found to correlate with the EIS of C_c ($F\text{ cm}^{-2}$) was 2.71×10^{-9} , Bode plot - $106\ \Omega\text{ cm}^2$ and Tafel polarisation results 7.56×10^{-6} MPY at 3 wt% of ZnO. Physical properties of 3 wt% loading of ZnO fillers in hardness test obtained 6H which was strongly attributed to the low interfacial interaction and poor dispersion of the fillers within the polymer matrix.

Keyword: Polyurethane acrylate; Corrosion; ZnO; Hybrid coating; EIS