Advanced Anticorrosion Coatings Prepared from Polybenzoxazine/ α -zirconium Phosphate Nanocomposites

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In this study, we present the first successful application of polybenzoxazine/ α -zirconium phosphate (PBa/ α -ZrP) nanocomposites for corrosion protection. α -ZrP nanoplatelets were exfoliated by a polyetheramine surfactant (Jeffamine M1000), and the α -ZrP dispersed well in the PBa matrix with no substantial agglomeration. PBa/ α -ZrP composite coatings were also prepared on the carbon steel substrate, and their anticorrosive properties were investigated in 3.5 wt% NaCl solution via electrochemical impedance spectroscopy and polarization curves. The results reveal that well-dispersed α -ZrP nanoplatelets in the PBa matrix effectively enhanced the corrosion protection ability of the coatings, attributing to the extended diffusion path of the corrosive agents in the coating to reach to the protected metal surface. The samples with 5 wt% α -ZrP nanoplatelets showed a corrosion rate of 0.108 mm per year for carbon steel after 8-day immersion, and the corrosion rate was less than half of that of the neat pristine PBa sample. These results of this study reveal that the incorporation of α -ZrP in the PBa matrix efficiently improved the corrosion protection of the PBa composite.

Keywords: Polybenzoxazines; α -zirconium phosphate; Nanocomposite coatings; Anticorrosion

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