Effect of Titanium Dioxide Nanogel Surface Charges and Particle Size on Anti-Corrosion Performances of Epoxy Coatings

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The relationship between surface charges and particle sizes of nanomaterials and their effects on the anticorrosion performance of epoxy organic coatings are not previously reported. Herein, the interfacial potential and size dependent of titanium dioxide (TiO₂) nanogel composite is investigated by changing the particle charges. In this respect commercially available TiO₂ nanoparticles are used as core to form nanogel composites based on 3-acrylamidopropyl) trimethylammonium chloride (APTAC) using radical crosslinking free surfactants solution polymerization. The surface charges of nanogel composites were changed by using co-monomer with APTAC such as acrylic acid (AA), N-isopropyl acrylamide (NIPAm) and 2-acrylamido-2-methylpropane sulfonate sodium salt (AMPS-Na). The particle size, surface morphology and thermal stability of TiO₂ nanogel composite were determined. The surface charges and their variation with pH of TiO₂ aqueous nanogel composite solutions were investigated. TiO₂ nanogel composites were embedded in epoxy coatings with different concentrations to investigate the effect of their surface charges, particle size and dispersability on anticorrosion performances of epoxy coatings in aqueous salt solutions.

Keywords: corrosion; TiO₂ nanogel composite; salt spray; epoxy organic coatings; steel.

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