Fabrication of Oxetane-Substituted Chitosan-Polyurethane Films with Excellent Anticorrosion and Self-Healing Performances

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The oxetane-substituted chitosan-polyurethane (OXE-CHI-PUR) film was synthesized using a simple, fast, and low-cost process, which is attractive for its many applications in the fields of self-healing anticorrosion. In this work, the OXE-CHI-PUR films with outstanding anticorrosion and self-healing performances were incorporated in epoxy resin coatings. SEM confirmed that the diameter of the OXE-CHI-PUR network film was approximately 380 μm ($\pm 4 \mu\text{m}$). FT-IR measurement proved that successful synthesis of the OXE-CHI-PUR network film. It is visually observed through the confocal laser scanning microscope that the scratched OXE-CHI-PUR coating has a self-healing tendency with UV irradiation. The electrochemical impedance spectroscopy (EIS) experiments analyzed the self-healing performance of OXE-CHI-PUR coating. The results of EIS and 14 days' seawater immersion tests revealed that the coating containing OXE-CHI-PUR films showed high anticorrosion performance and exhibited self-healing capabilities due to the influence of light and heat.

Keywords: UV irradiation; Self-healing performance; Anticorrosion

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