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Please fill in your manuscript title.	Corrosion Resistance and Durability Performance of Graphene-Modified Epoxy Glass Flake Paint for Offshore Structure Application	
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Abstract

Polymer coating material is most widely applied to protect the metal substrate from any type of corrosion. As far as the offshore application of the splash zone is concerned, epoxy glass flake (GF) paint is the most common system used to protect and provide superior corrosion resistance. However, when the coating has been continuously exposed to harsh environments for longer periods of time, such as saltwater and UV light, the coating may damage and lose contact between the coating and the metal substrate.

In this work, the effect of fine graphene thickness < 5 nm in epoxy GF paint on its corrosion resistance efficiency was investigated. The electrical impedance spectroscopy (EIS) method was used as a basic tool for evaluating the efficiency of the graphene paint system.

In order to investigate the durability of the coating, a long-term salt spray test of 3,000 hours of exposure was also performed. The mechanical performance was quantitatively assessed by the pull-off adhesion test. Overall, the addition of small amounts of graphene at less than 0.1 wt% substantially improved the corrosion resistance properties of the coating as demonstrated by EIS and long-term salt spray exposure.

The durability of the modified graphene paint after salt spray exposure, which was assessed through a visual inspection and a pull-off adhesion test, revealed that the adhesion performance remains higher compared to unmodified paint with lesser surface blistering and corrosion underneath, indicating the advantages of the graphene as an impermeable material for coating.