

## **A multifunctional carbon-based nanocomposite coating with UV protection and anti-corrosion properties**

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**Abstract** To address the degradation of epoxy coatings' mechanical properties and physical shielding under ultraviolet (UV) radiation, carbon-based nanomaterials (such as graphene oxide (GO), carbon black (CB), carbon nanotubes (CNTs), and their nanohybrids) have been incorporated to enhance the corrosion resistance and UV durability of waterborne epoxy coatings. The UV aging performance was assessed through exposure to UVB lamps and subsequent gloss analysis, while the corrosion resistance of both pure epoxy and nanocomposite coatings in a 3.5 wt% NaCl solution after UV radiation was evaluated using electrochemical impedance spectroscopy and salt spray tests. The findings demonstrate that epoxy coatings containing 0.1 wt% carbon-based nanohybrids, owing to their well-dispersed state within the polymer matrix, exhibit superior anti-corrosion and anti-UV properties. This study introduces a novel approach for improving the UV resistance and long-term corrosion resistance of epoxy coatings under intense UV irradiation, underscoring the significance of nanohybrids in advanced coating applications.

**Keywords** Layered structure; Nanocomposite; Carbon-based nanomaterial; Anti-corrosion; Waterborne epoxy coating

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