

## Melamine-Modified Graphene Oxide as a Corrosion Resistance Enhancing Additive for Waterborne Epoxy Resin Coatings

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**Abstract** Graphene oxide (GO), as an emerging two-dimensional nanocarbon material, has garnered considerable attention in the field of metal corrosion due to its unique specific surface area and exceptional corrosion resistance. yet their corrosion resistance and shielding properties demand further refinement. In this study, melamine-modified graphene oxide (MGO) was synthesized using a surface covalent functionalization approach. Different proportions of MGO were incorporated into a water-based epoxy coating, resulting in the development of a novel water-based epoxy/melamine-modified graphene oxide coating (WEP/MGO). The optimal modification ratio of melamine to GO was achieved. Furthermore, the corrosion protection efficiency of WEP/MGO coatings was systematically evaluated by examining the impact of different additions of MGO. The impedance modulus at the lowest frequency was increased from  $3.77 \times 10^8 \Omega \cdot \text{cm}^2$  of WEP to  $2.85 \times 10^9 \Omega \cdot \text{cm}^2$  after immersion in 3.5% NaCl for 48 h, when the addition of MGO was 0.1 wt.%. And the corrosion expansion at both the scratch and corrosion spot frequencies of the WEP-coated samples displayed a remarkable attenuation following exposure to salt spray for 300 h. The corrosion resistance and barrier properties of WEP coatings have been considerably enhanced.

**Keywords** Graphene oxide; Melamine; Waterborne epoxy coating; Corrosion resistance

### Reference

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