Preparation and study on antifouling property of functional acrylic-based self-polishing composite coatings

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Abstract A series of acrylic-based self-polishing composite coatings with excellent antifouling properties (BAP/GNG) are prepared, including the modulation of the content of monomers and the introduction of graphene-analogous 2D materials. Pyridinetriphenylborane is grafted in acrylic resin, which can be hydrolyzed in seawater to form a continuously renewed dynamic surface. The addition of graphene-analogous 2D materials to acrylic resins not only regulates the hydrolysis rate to enhance the antifouling ability of acrylic composite coatings but also provides photocatalytic properties to acrylic composite coatings. BAP/GNG composite coatings exhibited excellent algae anti-adhesion performance. Specifically, the inhibition rate of *Phaeodactylum tricornutum* reached 99.2%, and high antibacterial rates of up to 94.2% and 95% were obtained for *Escherichia coli* and *Staphylococcus aureus*, respectively. At the same time, the dynamic surface produced by hydrolysis are effectively able to inhibit mussel adhesion. Such functional acrylic-based self-polishing composite coatings show promise as an antifouling coating with potential applications in marine antifouling.

Keywords： Antifouling, Acrylic, Graphene-analogous 2D materials, Self-polishing

Reference

[1] Sha J, Chen R, Yu J, et al. Dynamic multi-level microstructured antifouling surfaces by combining quaternary ammonium modified GO with self-polishing copolymers [J]. Carbon, 2022.

[2] Wang N, Zhang R, Liu K, et al. Application of nanomaterials in antifouling: A review [J]. Nano Materials Science, 2024.