Antifouling coating bonded natural antifouling agents with dynamic surfaces for long-lasting marine antifouling applications

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Abstract Marine equipment is frequently attacked by intricate fouling, resulting in a series of problems, such as reduced operational lifespan and biological encroachments. To date, the use of antifouling coatings is considered to be the most effective, cost-effective and widely applied strategy. Constructing anti-fouling coatings containing dynamic surfaces can effectively prevent the adhesion of marine fouling organisms. Dynamic surfaces can shorten the contact time between organisms and surfaces so that their interactions are close to non-adhesive collisions, which reduces the interaction force with fouling organisms and facilitates their escape. Based on this strategy, we have successfully constructed a series of antifouling coatings with dynamic surfaces. In order to combine the antifouling advantages of dynamic surfaces and avoid the impact of antifouling agents on the metabolism and growth of nonspecific target organisms, natural antifouling functional groups were immobilized into the dynamic resin structure via covalent bonds. Therefore, synergistic inhibition of fouling adhesion by the natural antifouling functional groups and the dynamic surfaces is achieved. These findings emphasize the critical role of molecular structure design in coating systems to advance interfaces tailored for marine antifouling applications.

Keywords Antifouling coating; Dynamic surface; Natural antifouling agent; Interface design

Reference

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