The preparation and research of allicin antifouling coatings for marine ranch

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Abstract Seawater culture cages have always been plagued by the problem of marine biofouling in the process of aquaculture. This problem may decrease the permeability of cages, block water flow exchange, affecting the quality of aquaculture organisms, and even lead to the death of aquaculture organisms, resulting in huge economic losses[1]. The marine antifouling coating is one of the most economical and effective ways to protect the cages from marine biofouling. However, the copper ions released by cuprous oxide antifouling coatings widely used in aquaculture will accumulate in organisms, causing serious harmful effect to ecological environment [2].

In this study, a series of allicin grafted acrylic self-polishing anti-fouling resin was synthesized by free radical polymerization. Bacteriostasis experiment and immersion experiment were carried out to inspect the antifouling property and self-polishing rate. The results showed that the antibacterial rate increase with the increased allicin content, and the self-polishing rate can reach 8.83 $g \cdot d^{-1} \cdot m^{-2}$. The allicin antifouling coatings (AAC) made from allicin grafted acrylic self-polishing anti-fouling resin showed outstanding flexibility and adhesion force towards fish nets without particles, blisters and fragments during 10 month filed test in the Bohai Sea. The bright and clean fish nets verified the excellent antifouling performance of AAC. In order to investigate the feeding effect of AAC, the growth rates of zebrafish were tested. The results showed that the growth rate of zebrafish in the water tank soaked with AAC was 6.14% higher than that in the blank water tank, which proved that AAC not only cause no harm to zebrafish, but even had a feeding effect. It can greatly shorten the aquaculture cycle of aquatic products.

Keywords Allicin antifouling coatings; Seawater culture cages; environmental-friendly

Reference

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