LONGEVITY OF MARINE STRUCTURES

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In this study, researchers addressed two major challenges facing anti-corrosion coatings on underwater installations: microcrack damage repair and microbial contamination prevention. They developed a bifunctional anti-corrosion coating by combining water-triggered self-healing microcapsules with low-surface-energy fluoropolymers. Here's a summary of their findings:

1. Microcapsules Characteristics: The microcapsules prepared for the coating exhibited good mechanical, thermal, and environmental stability. They had an average diameter of 153 μm and an encapsulation rate of 66.7%.

2. Optimal Microcapsule Content: When the microcapsule content in the coating was 8 wt%, the dispersion performance of the microcapsules and the healing barrier effect of the composite coating were found to be optimal. At this concentration, the repair efficiency reached 81.6%.

3. Surface Properties: Compared to coatings without microcapsules or fluoropolymer grafts (PFG), the sample designated as PFG18/4/IPDI-MC/ER showed the largest surface water contact angle. This indicates improved hydrophobicity, which is beneficial for preventing microbial adhesion and biofouling.

4. Microbial Contamination Prevention: The PFG18/4/IPDI-MC/ER coating exhibited the best protein inhibition rate of 87%. This suggests effective prevention of protein adsorption on the coating surface, indicating potential for inhibiting microbial contamination and biofouling.

Overall, the developed bifunctional anti-corrosion coating demonstrated promising properties for addressing both microcrack damage repair and microbial contamination prevention on underwater installations. The combination of self-healing microcapsules and low-surface-energy fluoropolymers offers a novel approach to enhancing the performance and longevity of anti-corrosion coatings in marine environments.

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