

Method of Preventing Biofouling Using an Anti-Fouling Bio-Hydrogel Composition

Researchers at the University of South Florida have developed a biological hydrogel to coat surfaces of materials for submersion in water to prevent bio-fouling in the marine environment. Bio-fouling is the undesirable accumulation of microorganisms, plants and algae on ship hulls and marine sensors. It can result in corrosion, additional weight, reduction in visibility and decreased hydrodynamics, thereby causing huge material and economic costs in the maintenance of marine culture, naval vessels and scientific research. A wide variety of anti-fouling agents have been developed to prevent the attachment of organisms to objects exposed to the marine environment. One of the more commonly used agents, copper, is toxic to invertebrate and vertebrate marine organisms. Therefore, there is a need for anti-fouling agents with little or no environmental impact.

The new technology developed by our researchers addresses this need by utilizing a chemically stabilized hydrogel. With time under water, the gel slowly dissolves away from the surface thereby preventing attachment of fouling organisms such as barnacles and/or biofilm-producing bacteria. The hydrogel consists of any biological material or polymer that forms a gel such as type A gelatin. The bio-hydrogel can be chemically stabilized with cross-links. The cross-linking agent can be any chemical or catalyst that introduces new bonds in the gelled hydrogel polymer or forms a polymer itself that interposes with the biological polymer.

The rate of molecular dissolution of the hydrogel can be controlled by the concentration and thickness of the biopolymer in the hydrogel and the nature and concentration of the cross-linker used. Additional components, either molecular or particulate, can be added to the bio-hydrogel before or after cross-linking for enhanced properties. Graph shows that the number of days it takes for the bio-hydrogel to dissolve completely depends on the gelatin and cross-linker concentrations.

ADVANTAGES:

- Coating is self-shedding.
- Can be used to coat any man made or natural material surface such as MEMS sensors and optical windows.
- Exerts little or no influence on the ecosystem or the marine environment.
- In practice, the gel can be of any concentration to achieve desired properties.

Anti-fouling system with less environmental impact

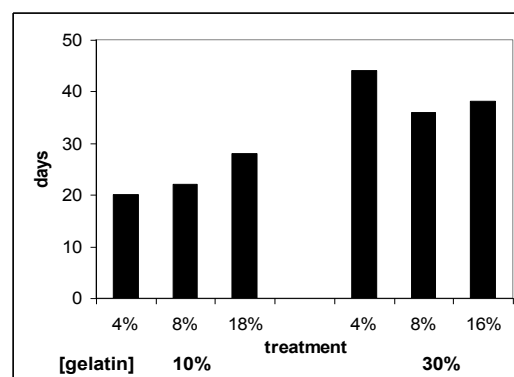


Fig. Number of days for complete dissolution of the hydrogel (Gelatin concentration of 10 or 30% and cross linker concentration of 4, 8 or 18% are used)