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Smart &innovative antifouling coatings in industrial applications

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Biofouling, which can be described as the colonization of marine organisms such as microorganisms, barnacles and seaweeds on submerged surfaces, is the fundamental problem in Marine industry since it causes to increased hydrodynamic drag resulting in significantly increased fuel consumption and greenhouse gas emissions. In antifouling applications, the challenge is to develop cost-effective design approaches rely on the eco-friendly materials that should be highly efficient in various types of organisms. From a physical point of view, the trend is moving towards to understand the fundamental driving forces that are able to eliminate surface interaction between microorganisms and surface. On this basis, rational design of stimuli responsive polymeric materials is the key concept towards solving this problem since it enables us to create complex molecular assemblies and interfaces that can be controlled by an external stimuli within desired time scales in various environmental conditions. The main objective of this study is to reconcile the key parameters in antifouling applications and the smart coating solutions offered by stimuli responsive materials. Our design consists of complex surface chemistry by employing various grafted PEG chains with functional end chains. Thus, to forge micro-topographic structure primes unfavorable surfaces to microorganism. The resulting of multi- functional graft chains to avert attachment of protein, carbohydrate, lipids and any other living cells. We achieved to have contact angle 133oCto 144oCat the range of super hydrophobic surfaces and our polymer can repel death and living organisms as a ratio between 84-91 %. We consider that our project broadens new approach to marine coating industry..

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