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Multi-function anti-fouling bio-active surfaces

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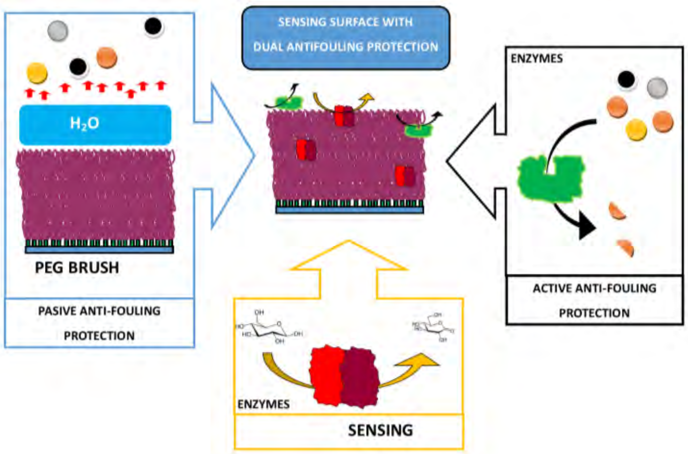
The development of long-term, non-contaminating, biocide free anti-fouling surfaces is of great importance and a challenge that requires cutting-edge scientific tools to gain successful outcomes. One solution, to overcome the coverage of biological material on wetted surfaces, called biofouling, is the use of non-adherent surfaces as polyethylene glycol (PEGs)[1] combined with environmentally friendly enzymes instead of environmentally harmful chemical biocides.[2] Using this combination of passive (PEGs) and active (enzyme) effects a more resistant surface against protein adhesion can be achieved. This surface attachment of proteins, microbes and marine organisms creates big problems in many applications, as for example medical implants, biosensors, water purification systems, textiles, food packaging and food storage, and marine and industrial equipment.[3]

Short PEGs are used (1000 -10000 nm) and covalently bounded to the surface producing a few nanometers barrier against protein adsorption. To achieve an even longer long-term stability the protease subtilisin is covalently bonded to the PEG surface. Proteases are known to remove the fouling substances or organisms that succeed to reach the surface in an effective way. Finally, traditionally used enzymes for sensing, e.g. glucose oxidase or horse-radish peroxidase are included in the coating to give sensing properties to the surfaces. In this proof of- concept design, we achieve a longer stability for long-term usage of the sensors in water environment.



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