



Multi-function anti-fouling bio-active surfaces

Ortiz, Roberto; Thormann, Esben

Published in:

Book of Abstracts. DTU's Sustain Conference 2015

Publication date:

2015

Document Version

Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Ortiz, R., & Thormann, E. (2015). Multi-function anti-fouling bio-active surfaces. In *Book of Abstracts. DTU's Sustain Conference 2015* [W-2] Technical University of Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Multi-function anti-fouling bio-active surfaces

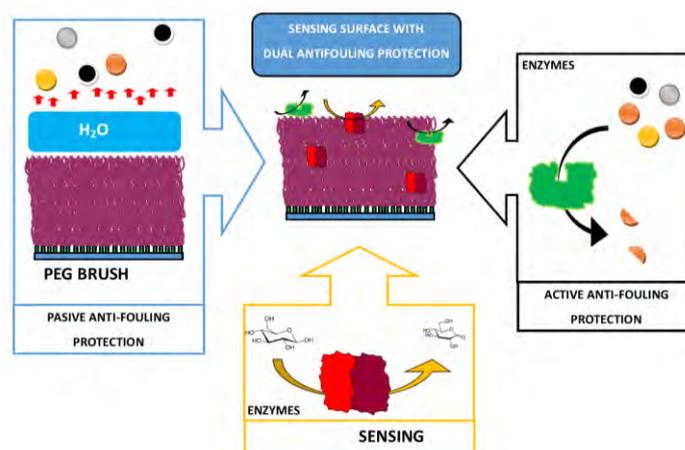
Roberto Ortiz*¹, Esben Thormann¹

1: DTU Kemi

*Robor@kemi.dtu.dk

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.



[1] a J. A. Callow et al., Nat Commun 2011, 2, 244; b T. Ekblad, et al., Biomacromolecules 2008, 9, 2775-2783; c S. Schilp, et al. Langmuir 2009, 25, 10077-10082. [2] a J. E. Gittens, et al. b J. B. Kristensen, et al, Biotechnology Advances 2008, 26, 471-481; c S. M. Olsen, et al., Biofouling 2007, 23, 369- 383; d M. E. Pettitt, et al., Biofouling 2004, 20, 299-311; e M. Tasso, et al., Biofouling 2009, 25, 505-516. [3] I. Banerjee, et al., Advanced Materials 2011, 23, 690-718.