

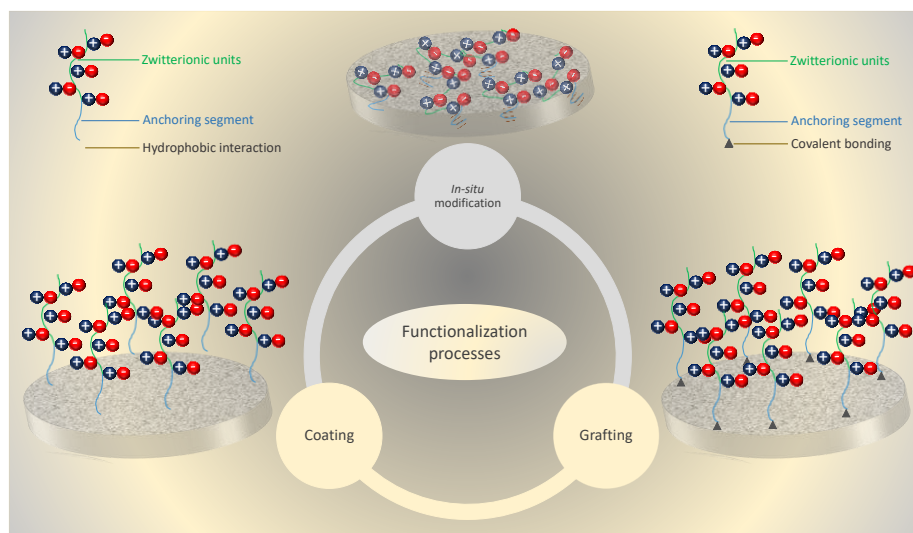
Low-Biofouling Membranes

Some Designs and Applications

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Abstract

Porous polymeric membranes are widely used in wastewater treatment or biomedical applications. In the related filtration processes, fouling and in particular biofouling is likely to occur, which ultimately generates higher costs associated to membrane cleaning, membrane replacement and production delays. This presentation is oriented toward the essential design strategies permitting to prepare low-biofouling membranes for medical or environmental applications: grafting *from/onto*, coating and *in-situ* modification. We aim at reviewing and highlighting some advantages and drawbacks of each approach from research works generated in our laboratory.

The first part will lay the focus on grafting processes permitting to hydrophilize highly hydrophobic materials such as PTFE, and turn them into potential materials for wound dressings, which require important features of nonfouling materials. Then, we will move onto the coating processes on which we put efforts to design membranes that could potentially be applied in blood filtration. Thirdly, we will introduce the *in-situ* modification approaches by liquid-induced phase separation and vapor-induced phase separation, that both permit to form and modify membranes in one single step. We will stress on membrane formation aspects, before moving onto the hydration properties and antifouling properties of such membranes, which we applied in contact with blood or with Microalgae.

There are many ways to prepare low-biofouling membranes, each method presenting a number of pros and cons, but from an economic perspective, the *in-situ* modification approaches are the most viable ones for mass production.

Keywords. Low-biofouling membranes; grafting; coating; *in-situ* modification.

About the speaker

Antoine Venault is an associate professor affiliated to the Department of Chemical Engineering of Chung Yuan Christian University and to the R&D Center for Membrane Technology, Chung-Li, Taiwan. He completed his PhD in 2010 at the University of Montpellier, France, under the direction of



Prof. Catherine Faur, and was a postdoctoral fellow at the RDCMT under the direction of Prof. Da-Ming Wang and Prof. Yung Chang. He then started to work as an assistant professor in August 2011. His major research interest is the design of non-fouling polymeric membranes by *in-situ* modification (LIPS or VIPS process) or self-assembling surface modification for water treatment, blood-contacting devices or wound dressings. He is also interested in the gravity-driven breaking of oil-in-water and water-in-oil emulsions using membranes with finely tuned structures. He has co-authored 50 SCI papers.