Poster LSH47

Towards the Ideal Contact-Active Antimicrobial Surface Via Grafting of Oligo(2-oxazoline)s Using $scCO_2$

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Biocontamination is a worldwide public health problem affecting numerous areas. Disinfection processes used nowadays are time-consuming, complex, environmentally unfriendly and do not always guarantee a full elimination of the bacterial contamination. As a result, it is crucial to find new alternatives to overcome bacterial adaptation to a surface, using green antimicrobial materials and/or environmentally friendly processes.

The challenge of this work consisted in the sustainable design of a material with high contact-active antimicrobial properties, envisaging biofouling prevention in biomedical and industrial applications. Our group has been developing clean methodologies to synthesize different antimicrobial oligo(2-oxazoline)s (OOXs) in $scCO_2$ [1], to physically blend OOXs in different ratios with natural polymers (e.g. chitosan, CHT) [2] , and for grafting OOXs to a polymeric surface using a solvent-free plasma technology.

Herein, we describe a supercritical fluid assisted method to graft biocompatible microbial repellent OOX-based composites onto the porous surface of a CHT scaffold. The OOXs-functionalized scaffolds showed good interconnectivity and high porosity, as well as large surface area, required features for biofouling applications. The grafting of antimicrobial OOXs into the surface matrix improved the CHT scaffold stability in physiological conditions, the ability to resist bovine serum albumin adsorption and also the ability to kill upon contact *S. aureus* and *E. coli*. The type of OOX and the mobility of the antimicrobial functional group on the materials surface were shown to significantly influence the antimicrobial surface performance on killing bacteria upon contact.

References

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