BIOSYNTHESIS AND CHARACTERIZATION OF PHACOS PRODUCED FROM MARINE BACTERIA AND STUDY OF THEIR ANTIADHESION AND ANTIFOULING ACTIVITIES

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Abstract

Polyhydroxyalkanoates (PHAs) are polyesters produced naturally by a variety of bacteria. They are stored intracellularly as cytoplasmic granules which constitute reserves of carbon and energy when environmental conditions become hostile. PHAs are considered as promising polymers and have attracted industry interest due to their biosourced, biodegradable characteristics and their high biocompatibility with the human body. Among the most remarkable PHAs are the second-generation PHAs, which contain original functional groups in their side chains. These groups allow the modulation of the physico-chemical properties of the polymers by chemical modification processes.

The present project focuses on the biosynthesis of 2nd generation bio-functionalized PHAs bearing acetylthioester groups (PHACOS), produced by bacterial fermentation from marine *Pseudomonas* strains. PHACOS have been shown to exhibit antimicrobial activity, notably against the multi-resistant strain of *Staphylococcus aureus* (MRSA).

Our objectives are, firstly, the development of bioconversion strategies in bioreactors leading to the biosynthesis of PHACOS. Secondly, the characterization of the physico-chemical properties of these PHAs by 1H NMR, DSC, SEC and contact angle. The mechanical properties of the coatings by profilometry and nanoindentation have also been studied. Thirdly, the evaluation of their antiadhesion activity in static condition on medical and marine microorganisms. After showing promising results on the antiadhesion, the antibiofilm activitiy has been measured on *S. aureus* and *Pseudoalteromonas* D41 by using the flow-cell system.

Keywords: PHACOS, antiadhesion, Pseudomonas, antifouling

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