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Tailoring functional PHA-based materials for biomedical applications

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Poly(3-hydroxyalkanoates) (PHAs) constitute a class of natural polyesters produced and accumulated by many bacteria as carbon and energy supply when an essential nutrient is limited. Due to their biodegradability and biocompatibility features, PHAs look promising candidates for biomedical applications especially in the fields of biomedical devices, tissue engineering or biodegradable drug carriers. For the latter application, amphiphilic bacterial PHAs-based diblock or triblock co-polymers have been synthesized and proved to self-assemble into micelles, nanoparticles or polymersomes in aqueous media. In the case of endovascular prosthesis, drug eluting stents are of great interest in the field of interventional cardiology by promising a long-term prevention of restenosis. An adequate drug release control, mechanical response to stent expansion and degradability of the coating are of major importance. The present approach described the potential use of poly(3-hydroxyalkanoate)s as biodegradable and compatible coatings. We also showed that electrospun biocomposite scaffolds based on biocompatible and biodegradable polyesters, such as poly(3-hydroxyalkanoate)s, will hold relevance as temporary supports for human mesenchymal stromal cells development and differentiation with a high therapeutic potential in tissue regeneration processes. Recently, we developed antibacterial biomaterials based on PHAs by different photochemical modifications of the surface. Such PHAs derived materials led to a tremendous inhibition of the adhesion of *Staphylococcus aureus* and *Escherichia coli*.

Biography

Valerie Langlois has completed her PhD from University Paris VI. She is now a Deputy Director of the East Paris Institute of Chemistry and Materials Science, France (Université Paris Est, CNRS). Her main scientific interests are related to biodegradable polyesters, their chemical modifications and synthesis of copolymers. Her research activities are devoted to fundamental aspects of biodegradable polyesters in relation with their biomedical applications such as drug delivery systems, tissue engineering or antibacterial materials. She has published more than 80 publications in this research field.

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