Jean-François Gerard, J Bioremediat Biodegrad 2016, 7:6(Suppl)
http://dx.doi.org/10.4172/2155-6199.C1.004

International Conference on

Sustainable Bioplastics

November 10-11, 2016 Alicante, Spain

Jean-François Gerard

Universite de Lyon, France

Electrospun fibers from biosourced and biodegradable polymers for biotechnological applications

Electrospinning process is one of the most promising routes for the design and development of smart textiles based on polymer nanofibers. From a proper selection of the electrospinning process parameters and polymers, (multi)functional textiles could be proposed. In this lecture, we will show how bio-based polymers, such as PLA-based and biodegradable polymers, such as PBAT, can be used to prepare electrospun scaffolds. In the first part, electrospinning is applied to neat polylactic acid (PLA) and to PLA-based blends, i.e. PLA/polyethylene glycol-b-polylactic acid block copolymers and PLA/PEG homopolymer. Electrospun membranes exhibit fibers having diameters from 110 to 310 nm depending on the composition and large amounts of porosity (about 80% vol.) which are required for cell culture application. *In vitro* degradation, as well as the hydrophilicity of the electrospun scaffolds, can be finely tuned from material composition. Fluorescence microscopy shows that the PLA electrospun fibers based scaffolds are good candidates for the survival and proliferation of neural stem cells. Even if the introduction of hydrophilic segments, i.e. polyethylene glycol from PLA-b-PEG block copolymer, leads to the same level of proliferation than PLA-based membranes, the PLA/PLA-b-PEG electrospun membranes exhibited the suitable hydrolytic degradation required for implantable scaffolds. The second part deals with the development of biodegradable PBAT electrospun membranes with potential applications in the field of smart textiles. As mentioned previously, the fiber morphology is strongly dependent on the tip-collector distance, concentration, and applied voltage. Smooth fibers and beads free membranes could be prepared and analyzed to establish morphology-properties relationships. PBAT membranes having the best thermal and mechanical properties were selected as host of a curli protein which is able to complex heavy metals. In fact, by electrospinning, porous membranes exhibiting a large surface-to-volume ratio could be proposed for chelation of pollutants such as nickel.

Biography

Jean-François Gerard has got his PhD in Polymer Science in 1985 and his research work was mainly focused on the synthesis of zwitterionic polyurethanes from sulfobetainic diols for self-emulsifying systems. He joined CNRS as a Scientist and his expertise deals with interfaces in polymer-based materials and nanostructured polymers. He is an author of about 240 papers in international journals and 110 invited lectures in international conferences. He is also the Vice President of the European Center for Nanostructured Polymers and President of the European Polymer Federation.

jean-francois.gerard@insa-lyon.fr