Influence of the covalent grafting of bioactive polymers onto PCL fiber scaffolds: Surface characterization, intrinsic proprieties investigation and *In vitro* biological response



G Amokrane, S Ramtani, V Migonney, C Falentin-Daudré

[1] *LBPS, UMR CNRS 7244, Institut Galilée, Université Paris 13 Sorbonne Paris Cité, 93430 Villetaneuse, France*

Abstract:

Electrospinning, an electrostatic fiber fabrication technique has evinced more interest in recent years due to its versatility and potential for divers applications especially in tissue engineering.[1] Polycaprolactone (PCL) has been approved for biomedical application and offers excellent mechanical properties and slow biodegradation, making it appropriate for use as a scaffold.[2] Previous studies carried out in our laboratory have shown that the covalent "grafting from" of polymers or copolymers bearing anionic groups such as sulfonate, carboxylate and phosphonate can favor cell adhesion and differentiation.[3-4] We have been working on this issue to develop functionalized PCL fiber scaffolds (PFSc) that can be used in tissue engineering applications. Toluidine blue (TB) colorimetric method, Fourier-transform infrared spectra (ATR-FTIR), contact angle measurement, scanning electron microscopy (SEM-EDS) and x-ray photoelectron spectroscopy (XPS) were applied to characterize the surfaces. In addition, possible changes in PCL properties have been studied using mechanical characterization, size exclusion chromatography (SEC), and differential scanning calorimetry (DSC). Finally, *In vitro* assay experiments were carried out to observe the fibroblast cell behavior. This study shows the elaboration of various PCL fiber scaffolds, their functionalization by the grafting of various bioactive polymers and the appreciation of the mechanical and microstructural changes. The *in vitro* biological assays have shown that depending on the PFSc microstructure, its surface functionalization by different polymers and its surface hydrophilicity, different cell behaviors can be observed.

Biography:

Dr Gana Amokrane is graduated in Dental surgery at the faculty of medicine of Algiers and completed his master's degree in biomaterials at the University of Paris 13. He is currently a third year PhD student in biomaterials science with the Laboratory of Biomaterials For Health (LBPS) based at the University of Paris 13. His work involves the elaboration of various PCL fiber scaffolds by electrospinning and their functionalization by covalent "grafting from" of bioactive polymers bearing anionic groups in order to produce biodegradable functionalized scaffolds for use in tissue engineering applications.

Research Interests: biomaterials, grafting, functionalization and material characterization

References:

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Mail Id: gana.amokrane@univ-paris13.fr
Contact number: 00336 51 78 59 01