Christine Jerome, J Chem Eng Process Technol 2017, 8:4 (Suppl)
DOI: 10.4172/2157-7048-C1-005



## Chitosan, a promising biomaterial for tissue engineering

**Christine Jerome**
CERM University of Liege, Belgium

Polymer hydrogels resemble the natural living tissue due to their high-water content and soft consistency. They find many applications in the design and production of contact and intraocular lenses, biosensors membranes, matrices for repairing and regenerating a wide diversity of tissues and organs. Derived from chitin, chitosan is a unique biopolymer that exhibits outstanding properties, beside biocompatibility and biodegradability. Most of these peculiar properties arise from the presence of primary amines along the chitosan backbone. As a consequence, chitosan based hydrogels have shown a great potential for biomedical and pharmaceutical applications. Being degraded in a physiological environment into non-toxic products, chitosan is an outstanding candidate for short- to medium-term applications, such as tissue engineering. In this respect, the preparation of chitosan nanometric fibers mats is highly interesting as such structure mimics the one of skin extracellular matrix. Chitosan nanofibers can be prepared by electrospinning but suffer from weak mechanical resistance if they are used as such. Therefore, strategies allowing to generate chitosan based nanofiber mats exhibiting a mechanical resistance strong enough to be easily handled while keeping the peculiar features of chitosan hydrogels favoring the interaction with cells and soft tissues to provide efficient tissue reconstruction are needed. Three strategies that revealed to be efficient to improve the mechanical properties of chitosan nanofiber mats while preserving their biological properties are (i) combination of electrospinning with the layer-by-layer deposition of chitosan, (ii) chemical cross-linking of chitosan electrospun nanofibers and (iii) combination of chitosan/poly-caprolactone electrospun multilayers. The control of the nanofiber structure offered by the electrospinning technology makes the developed processes very promising to precisely design biomaterials for tissue engineering as demonstrated by preliminary cell culture tests corroborating the potential use of such systems in wound healing applications.

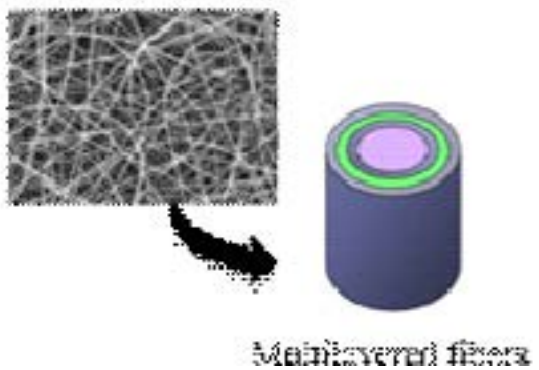

Figure 1: chitosan/hyaluronic acid deposition on charged electrospun polycaprolactone nanofibers

### Biography

Christine Jerome, full Professor at the University of Liege, has expertise in polymer chemist passion in developing biomaterials to improve health and well-being. She has developed green strategies for the synthesis, functionalization and processing of polymer materials, degradable or not, to precisely tailor their properties and design supramolecular structures customised to the targeted biomedical application and needs.

c.jerome@ulg.ac.be