Fibrillar polymeric patches suitable for wound healing

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Multilayered scaffolds can be designed to improve soft material applicability for regenerative medicine purposes. Excellent results can be obtained by combining the main characteristics of the biopolymers and giving a specific function to each layer. A microfluidic-assisted electrospinning process is an elegant arrangement between two fiber fabrication techniques that defines finely every portion of an electrospun scaffold. Unlike classic electrospinning technique, multiple flows can be carefully monitored and separated in real time using microfluidic sensors. This method allows users to establish anisotropic properties to scaffolds, in other words it is possible to modulate gradients by changing flow parameters. In this regard, patches consisting of biodegradable and biocompatible random copolymer polycaprolactone/polyurethane with two different technique had been produced and compared. Working conditions of both technique, classic and microfluidic-assisted electrospinning, had been found. Results showed benefits of microfluidic and electrospinning coupling, such as smaller diameter of fibers, homogeneity of patch and higher percent yield. Next goal is to combine polycaprolactone/polyurethane layer with a polysaccharide layer. Indeed, in wound healing application, it could be useful to obtain a patch with two sides, one of them exerts its therapeutic function releasing an active ingredient (e.g. drug, growth factor) while the other side gives impermeability to the patch, as a skin substitute.

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3) Lai, HJ et al (2014) Acta Biomater 10: 4156 – 4166