(OP 260) Starch/Ethylene-Co-Vinyl Alcohol Fiber Mesh Scaffolds: Production, Characterization and Surface Modification

I. Pashkuleva[1,2,3], H. S. Azevedo[1,2,3], P. M. López-Pérez[1,2], R. L. Reis[1,2]

[1]3B's Research Group–Biomaterials, Biodegradables and Biomimetics, Dept. of Polymer Engineering, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal

[2]IBB–Institute for Biotechnology and Bioengineering, PT Government Associated Laboratory, Braga, Portugal
[3]These authors contributed equally to this work.

Tissue engineering scaffolds must provide cell anchorage sites, mechanical stability and structural guidance. Fiber mesh structures have been considered as adequate scaffolds for tissue engineering due their high surface area available for the adhesion and proliferation of different cell types. In addition, they present a good degree of interconnectivity between pores, which is essential for the migration of cells and diffusion of nutrients.

Herein, we propose a new route to produce fiber mesh scaffolds from a starch/poly(ethylene-co-vinyl alcohol) (50/50-%wt) blend. Scaffolds with porosity up to 80% were obtained by a simple wet spinning technique based on solution/precipitation of a polymeric blend and subsequent fiber sintering to stabilize the produced 3D structures. The proposed wet spinning procedure avoids thermal degradation, typical for the conventional melt spinning techniques, as shown by thermal gravimetric analysis.

The high surface area and the presence of –OH groups in the blend components caused relatively high values of water uptake (about 110%). On the other hand, the samples presented very low percentages of weight loss in buffer solution, which reveals their stability in aqueous media.

To enhance cell attachment and proliferation, plasma treatment was applied to the produced scaffolds. The untreated and treated scaffolds were examined using SaOs-2 human osteoblastic cell line. The results showed that SaOs-2 were able to attach and proliferate on the studied materials. However, double concentration of DNA was measured for the modified scaffolds after 2 weeks of culture. Moreover, the cells seeded onto the treated samples showed more spread morphology with extended filopodia.