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## *Abdel Salam H Makhoulf*

University of Texas Rio Grande Valley, USA

### Quick fabrication of highly porous dual tissue scaffolds using textile techniques

Quick fabrication of three-dimensional (3D) scaffolds with tunable mechanical properties while retaining their highly porous structure have received an increasing interest for fabrication of vascular tissue scaffolds. Conventional methods such as electrospinning have several drawbacks including limited production rate, scaffold porosity, and the need for electrical charging of polymer solutions during synthesis. Textile techniques for making fabrics allow fast fabrication and porous architectures. This article presents the concept of single and dual air jet spinning (AJS) for the fabrication of finely tuned micro and nano-fibrous membranes and vascular grafts for use in tissue engineering applications. The mechanism of AJS is based on the extrusion of polymer solutions, under controlled pressure and polymer solution properties, through a nozzle that allows for precisely tuned fiber morphology, diameter, mechanical properties and web porosity. We successfully optimized the experimental parameters for fabrication of fibrous scaffold membranes composed of pure polycaprolactone, pure nylon 6 and their mixtures at different ratios. The scaffold biocompatibility was examined by analyzing cell attachment and proliferation by seeding with EA.hy926 endothelial cells. Surprisingly, the AJS method developed in this article facilitated (in less than 3 minutes) the fabrication of 3D constructs that are highly porous and supportive of permeability to nutrients and metabolites. Therefore, we believe that the AJS approach could be a promising method for the fast construction of high performance micro and nanofiber vascular structures that are not amenable to compete with other conventional techniques such as electrospinning.

### Biography

Abdel Salam H Makhoulf is a Star Professor and Founder of Surface Engineering Laboratory at UTRGV. He is a multiple-award winner for his academic excellence. He received several prestigious awards in Germany (Humboldt Research Award for Experienced Scientists at Max Planck Institute) and USA (Fulbright Visiting Scholar, NSF Fellow, and DOE Fellow). He is an Expert Evaluator for the EU's FP7, German Ministry of Education and Research, German Academic Exchange Service, and German Aerospace Center. He is a reviewer for the US Fulbright Commission, and a reviewer/panelist for several NSF programs. His publication list (+200) includes 11 books, 21 book chapters, and 2 US patents. He supervised 11 PhD and Master's students, and 5 Post-doctoral fellows.

abdel.makhoulf@utrgv.edu

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