Development of porous electrospun scaffolds with advanced electromechanical properties for cardiac tissue engineering

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Synergy between micro-nanotechnology and tissue engineering can lead to new tools for health improvement. Engineered scaffolds have been widely used as structural and functional supports on which cells are seeded for the generation of cell therapy products and for disease modelling. An important aspect of a successful scaffold is to mimic the fibrillar structure of extracellular matrix (ECM), which provides essential guidance for cell organization, survival and function. Recent advances in nanotechnology have greatly improved our capacities to mimic the ECM. Among them, electrospinning is a widely used technique for the development of nanofibrous scaffolds, it is easy to process and cost-effective. The combination of electrospinning with electroactive polymeric materials, can further enhance scaffolds electro-mechanical properties and provide reinforced physical stimuli. Poly (vinylidene fluoride) (PVDF) is a polymer with attractive electroactive properties. In tissues transmitting electrical signals, such as cardiac muscle, bone and neurons, this material appears as a promising scaffold' candidate. In this talk, electrospun PVDF scaffolds will be presented with improved structure combined with surface functionalization for enhancing cardiac cells' attachment and maturation.

References:

Kitsara et al., Nanoscale, 2019, DOI: 10.1039/C8NR10384D

Kitsara et al. Acta Biomaterialia, 48, 20-40, 2017.