One-step fabrication of mechanically gradient electrospun scaffold using vanadium for neural tissue engineering

이나라, 최우용, 조미라, 김주원, 장재형†
연세대학교
(j-jang@yonsei.ac.kr†)

This work focuses on the fabrication of 3D scaffolds composed of multi-layered fibrous sheets having features of microchannels. Previous studies have reported the spontaneous formation of multi-layered scaffolds by the single-jet electrospinning of a polymeric solution. The simple addition of additives, vanadium(III) chloride with polycaprolactone (PCL) solution, forms multi-layered structures. Vanadium-doped PCL fibers can have a different morphology for each sheet as the pore size changes. Every layer of the sheets allows the diffusion of drugs and other soluble factors to target tissues or organs. Also, these scaffolds have good distribution of the cells as seeding and attaching of the cells occurs on individual layers that are subsequently stacked. Under dynamic conditions, medium flow through the channels enhances nutrient availability to the cells on the multiple layers, increasing cell proliferation on all layers. We applied one-step gradient scaffold fabrication to neural cells, including dorsal root ganglion (DRG) and human neural stem cells, and assessed the potential as a tissue engineering scaffold.