Characterizing electrospun 3D matrices for biomedical purposes

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Polymers are widely used in our everyday life, as well as for medical or pharmaceutical purposes. For that reason, natural and biocompatible polymers are getting more and more attention to use them in a harmless way. Technological advances made it possible to create micro-, and nanofiber based artificial matrices from these polymers to be used for simple filtration systems or mimic the extracellular matrix (ECM). These matrices look very close to ECM and can act like a scaffold for cell cultures as well. One of the methods to create fibers is the electrospinning technique. Varying the electrospinning parameters, we can influence the properties as well, to fine tune the system for a desirable outcome. To create a high porosity fibrous mesh for culturing cells in a suitable three-dimensional way, we need to step forward from conventional electrospinning. Our aim was to create and characterize 3D fiber structures from Poly(succinimide) with the help of electrospinning. Therefore, the effect of the presence of different inorganic salts (LiCl, $MgCl_2$, $CaCl_2$) and the effect of humidity on the fiber structures were investigated. By adding salt to the polymer solutions, the weight percent needed to create homogenous fibers were decreased along with the fiber diameter (from 25 to 20w/w%). The conductivity and infrared spectra of salt-solvent, polymer solution and the fibers were measured. Increasing the amount of $CaCl_2$ increased the tensile strength as well. A critical humidity level was defined as a threshold to create 3D fiber structures. The fiber diameter and surface roughness were analyzed and observed with the help of Scanning Electron Microscopy.

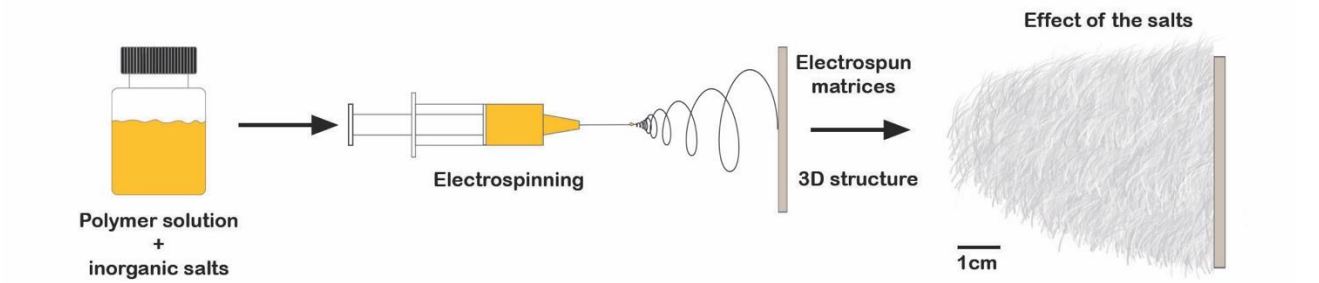

Figure 1: Different steps of creating a three-dimensional fiber structure

REFERENCES

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