Functional Nanofibers via Electrospinning

Fatma Kayacık, Aslı Çelebioğlu, Ali Ekrem Deniz, Zeynep Aytaç, Tamer Uyar

UNAM-Institute of Materials Science & Nanotechnology, Bilkent University, Ankara, 06800, Turkey
tamer@unam.bilkent.edu.tr

Electrospinning is a very versatile and cost effective process for producing multi-functional nanofibers from various polymers, polymer blends and composites, etc. Electrosplun nanofibers/nanowebs have remarkable characteristics such as large surface-to-volume ratio and with pore sizes in the nano range. In addition, it is fairly easy to improve the functionality of the nanofibers by incorporating additives during the electrospinning process. The unique properties and multi-functionality of these nanofibers/nanowebs make them very interesting and appealing in various areas including biotechnology and nanotechnology with particular applications in filtration, textiles, energy, sensors and tissue engineering, etc [1-3].

Here, we have produced functional electropun nanofibers/nanowebs from different kinds of natural/synthetic polymers. In addition we incorporated functional additives such as cyclodextrins and metal oxides in order to obtain multi-functional nanofibrous nanocomposite structures. The optimizations of electrospinning parameters were carried out for obtaining bead-free uniform nanofibers. It has been observed that the morphologies of the resulting electrospun nanofibers were highly dependent on the solvent types and the concentration of the polymer solutions. This work summarizes our recent findings on the development of functional nanofibers/nanowebs via electrospinning and their possible applications in nanotextiles, nanofilters and biotechnology.

Figure 1. Schematic view of electrospinning

REFERENCES

[1] Ramakrishna, S., Fujihara, K., Teo, W., Lim, T., Ma, Z. An Introduction to Electrospinning and Nanofibers, World Scientific Publishing Co., 2005.