**Chitosan properties and electrospinning applications**

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Due to their abundance in nature, polysaccharides are among the most promising natural materials suitable for replacing synthetic polymers in a variety of applications. Among others, chitosan is a naturally occurring bio-based polysaccharide that is employed in the creation of environmentally friendly and sustainable products for a variety of uses (agriculture, food products, biotechnology, biomedicine, and pharmaceuticals). Chitosan is receiving significant interest since it is widely available, biodegradable with non-toxic and its physical and chemical properties are easily manipulated1. Chitosan is often insoluble in acidic solutions, but its structure can be protonated due to the presence of primary amine groups and hence it is characterized as soluble at acid environment2. Recently, chitosan-based nanofibers have received a lot of attention as potential biomaterials. They are effectively produced through electrospinning, among other methods3,4. The required nanofiber size and microstructure can be achieved by adjusting a wide range of parameters improving the spinnability of the polymer. Characteristically, by altering the chitosan relative concentration in various solvents, chitosan nanofibers can be produced differing at size.

The objective of this study was to investigate the electrospinning process parameters that influence chitosan nanofibers’ production. We investigated the effects of varied polymer and acetic acid (solvent) concentrations on viscosity, zeta-potential and electric conductivity of the solutions. The spinnability and morphology via transmission electron microscopy (TEM) of final structures were also characterized. According to our results, the rheological studies revealed that electro-spinnability and fiber morphology strongly depended on solution viscosity. We concluded that this was an effective approach for creating a novel bio-friendly alternative to commonly used synthetic polymers.

**References**

1. Pakravan, M., Heuzey, M. C. & Ajji, A. A fundamental study of chitosan/PEO electrospinning. *Polymer (Guildf).* **52**, 4813–4824 (2011).

2. Pillai, C. K. S., Paul, W. & Sharma, C. P. Chitin and chitosan polymers: Chemistry, solubility and fiber formation. *Prog. Polym. Sci.* **34**, 641–678 (2009).

3. Shikhi-Abadi, P. G. & Irani, M. A review on the applications of electrospun chitosan nanofibers for the cancer treatment. *Int. J. Biol. Macromol.* **183**, 790–810 (2021).

4. Sencadas, V. *et al.* Determination of the parameters affecting electrospun chitosan fiber size distribution and morphology. *Carbohydr. Polym.* **87**, 1295–1301 (2012).