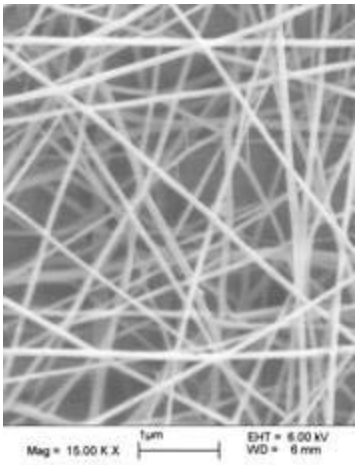
Surface Properties of Electrospun Chitosan Nanofibers

Non-woven fiber mats of chitosan (see figure) with potential applications in air and water filtration were successfully made by electrospinning



nanofibers of chitosan and poly(ethylene oxide) (PEO) blend solutions. Chitosan is a non-toxic, biodegradable material derived from chitin which is the major structural material in the exoskeletons of crustaceans, insects and some fungi. It exhibits some antimicrobial properties and is able to bind toxic metal ions which can be beneficial for filtration applications. However, production of nanofibers of pure chitosan was not possible, and small amount of synthetic PEO has to be added to the chitosan to produce fibers. An effort was made to maximize the amount of chitosan needed to produce high quality nanofibers. We were able to increase the amount of chitosan to 95% by spinning the fibers at temperatures above room temperature (up to 70 C). Fibers with diameter as low as 80 nm were produced. These non-woven mats were able to bind as much as 22 mg of chromate ions per gram of chitosan. The nanofibers were 50 times more efficient in chromium binding than a similar material in film form. The nanofiber mats with 95% chitosan were able to kill 99.7% of *E. coli* bacteria after 6 hours. This antimicrobial effect was 100 times more efficient than that of the same material in film form (93 μm thick).

Desai, Keyur; Kit, Kevin; Li, Jiajie; Zivanovic, Svetlana, "Morphological and Surface Properties of Electrospun Chitosan Nanofibers", *Biomacromolecules*, Vol. 9, pp. 1000–1006 (2008)

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