

### **418c Aligned Electrospun Nanofibers**

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Electrospinning is a rapidly developing technology that provides a unique way to produce novel polymer nanofibers with diameters from 50 nm to 500 nm. Electrospun fibers have been used in various applications including filtration media, biomedical, ceramics and composites. Electrospinning uses an electric field to draw a polymer solution jet from the tip of a capillary to a collector. The fine jets dry to form polymeric fibers. The polymeric solution being used in this research is 10 wt% poly vinyl alcohol in water. The solution was prepared by vigorous mixing and constant heating at 90 Deg C for 12 hours. The driving force of the jet is provided by a high voltage source. A total of 9 kV was applied over a distance of 10 cm to produce uniform fibers. A combination of positive polarity at the needle tip and negative polarity at the collector has proven to yield the most predictable fiber morphology. Adjusting the flow rate of the fluid and the magnitude of the electric field controls the spinning rate, which ultimately influences fiber size. A syringe pump rate of 0.2 ml/hr through a 20 gauge needle tip has been employed. Through careful control of the experimental parameters, aligned fibers with a narrow width distribution can be ascertained. Aligned nanofibers are essential for developing high strength nanocomposites. Morphological studies have been performed using an environmental scanning electron microscope (ESEM) and scanning electron microscope (SEM). Image analysis of typical electrospun samples have shown that at least 80 % of the fibers are aligned within 10 degrees and the diameters range from 300 to 450 nm. This project is financially supported by Michigan State University Research Excellence Fund.