Electrospinning of Biocompatible Nanofibers

ANDREW J. COUGHLIN\(^1\), North Carolina State University, HAILEY A. QUEEN, North Carolina State University, SETH D. MCCULLEN, North Carolina State University, WENDY E. KRAUSE, North Carolina State University — Artificial scaffolds for growing cells can have a wide range of applications including wound coverings, supports in tissue cultures, drug delivery, and organ and tissue transplantation. Tissue engineering is a promising field which may resolve current problems with transplantation, such as rejection by the immune system and scarcity of donors. One approach to tissue engineering utilizes a biodegradable scaffold onto which cells are seeded and cultured, and ideally develop into functional tissue. The scaffold acts as an artificial extracellular matrix (ECM). Because a typical ECM contains collagen fibers with diameters of 50-500 nm, electrostatic spinning (electrospinning) was used to mimic the size and structure of these fibers. Electrospinning is a novel way of spinning a nonwoven web of fibers on the order of 100 nm, much like the web of collagen in an ECM. We are investigating the ability of several biocompatible polymers (e.g., chitosan and polyvinyl alcohol) to form defect-free nanofiber webs and are studying the influence of the zero shear rate viscosity, molecular weight, entanglement concentration, relaxation time, and solvent on the resulting fiber size and morphology.

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