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1:00 PM

SCIENCE AND ENGINEERING RESEARCH CENTER (SERC),

BME SMARTBOARD ROOM #2013

Bhoomija Hariprasad

MS Thesis Defense

Dr. Mohammad Reza Abidian, Faculty Advisor

“Coaxial Electrospinning of Protein-Encapsulated Core-Shell Nanofibers: Process Optimization, Release Modeling, And Environmental Effects”



Abstract

Coaxial electrospinning is a novel method for encapsulation of protein drugs into polymeric materials for use in drug delivery systems. In this study, coaxial electrospinning was used to fabricate aligned polyethylene oxide/poly(lactic-co-glycolic acid) core-shell nanofibers encapsulated with nerve growth factor (NGF), a trophic agent for axonal regeneration. The effects of various environmental conditions on NGF detection from core-shell nanofibers were tested using enzyme-linked immunosorbent assay (ELISA). Electrospinning processing parameters, namely inner and outer flow rates, wheel speed, needle-wheel distance, and applied voltage, were optimized using design of experiment (DOE) methodology to achieve nanofibers with minimized diameter and size distribution. Optimized fibers were incubated in phosphate-buffered saline (PBS) for 3 days, and the released NGF was characterized at different time points using ELISA. The NGF release profile was mathematically modeled utilizing the Korsmeyer-Peppas and zero-order models. The results of this study can be applied to drug delivery systems for neural regeneration.