Free Surface Electrospinning of Microemulsions Containing Vitamin E

Fatima Islam, Kelly Linck, Juana Rodriguez,
Nancy Rodriguez and Keith M. Forward*
California Polytechnic State University, Pomona
e-mail: kmforward@cpp.edu*

***Abstract*—An estimated 90% of active pharmaceutical ingredients (APIs) in research and development are poorly soluble or insoluble in water. These APIs exhibit poor bioavailability in solid dosage forms as a result of their poor solubility. In order to increase the release rate of APIs, we consider free surface electrospinning of a microemulsion as a means to produce submicron size domains of API dispersed in an amorphous excipient. Microemulsions containing vitamin E, a poorly soluble API, Kolliphor EL, a surfactant, and Polyvinylpyrrolidone, an excipient, are electrospun to produce highly porous nanofibers with high specific surface area, which promotes rapid drug release. Turbidity measurements were taken as a means to standardize the preparation process and to evaluate the stability of produced microemulsions. In free surface electrospinning, multiple jets are formed from a free liquid surface, resulting in higher productivities over conventional needle-base electrospinning. This method gives the opportunity to alter the quality of fibers. The working distance, applied voltage and spindle rotation were examined. The produced electrospun nanofibers were characterized by scanning electron microscopy. High performance liquid chromatography (HPLC) was utilized to evaluate the dissolution rate of the final material. The fibers contained significant amounts of Vitamin E encapsulated within the excipient, and release rates were significantly improved over compared thin films. This technique may be utilized to improve the downstream production of pharmaceuticals, which would result in lower operating costs and improved uniformity over current batch manufacturing processes.**