Zein Nanofibers Produced by Electrospinning

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In current years, much attention has been paid to zein, major corn protein due to economical and environmental reasons [1]. Low toxicity, biocompatibility, biodegradability and film forming ability make zein polymer appropriate for various biomaterial applications. Nowadays, zein is predominantly used for coating tablets or food [2]. It provides protection, controlled release, and/or masking of flavors and aromas depending on the surface properties of packaging materials [1, 2].

Electrospinning is the most versatile and cost effective method for fabrication of nanofibers which have unique properties like small pore size, large surface area to volume ratio, and high porosity. These properties make electrospun nanofibers more attractive for many applications such as filtration, textile, tissue engineering, wound healing, release control, sensors, energy, etc. [3, 4].

In this study, electrospinning of zein nanofibers was performed by using ethanol/water and N,N-dimethylformamide (DMF) solvent systems. The effect of the solvent and the polymer concentrations on the morphology, uniformity and dimensions of the electrospun zein nanofibers were analyzed by using scanning electron microscopy (SEM).

While the fibers produced from ethanol/water solution have predominantly ribbon-like morphology, zein nanofibers electrospun from DMF solution have round morphology (fig.1.). In addition, we found that the fiber diameter distribution of the electrospun zein nanofibers was strongly depended on the viscosity and the conductivity of the zein solutions.

Fig.1. SEM images of the electrospun zein nanofibers from different solvent systems: a) ethanol/water and b) DMF.

This study mainly deals with the optimization of the electrospinning of zein nanofibers from different zein concentration using different solvent systems. We expect that electrospun zein nanofibers may extend the application areas of zein polymer. As the future work, our goal is to develop functional nanofibers for packaging application by adding functional additives into the zein nanofibers/nanowebs.

REFERENCES