

Electrospinning Fabrication and Characterization of Polymer - SiO₂ Hybrid Nanofibers

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1. INTRODUCTION

Electrospinning technique has attracted great interest among academic and industrial scientists because it is very simple, low cost, and effective approach to produce nanofibers which have been exhibited outstanding properties such as high specific surface area and high porosity [1-4]. These type of nanofibers could be used for a wide variety of applications such as in biomedical engineering, filtration, protective clothing, catalysis reactions, and sensors.

2. EXPERIMENTAL

During electrospinning, high-voltage power (model CPS-60K02VIT, Chungpa EMT Co. Ltd., Seoul, Korea) was applied to the polymer/SiO₂ blend solution contained in a syringe via an alligator clip attached to the syringe needle. The applied voltage was adjusted from 5 to 20 kV. The solution was delivered to the blunt needle tip via syringe pump to control the solution flow rate. Fibers were collected on electrically grounded aluminum foil placed at 5, 10, 15, and 20 cm vertical distance to the needle tip [1-4].

3. RESULTS AND DISCUSSION

TEM was used to observe dispersion of silica nanoparticles in polymer matrix. The TEM image of polymer/SiO₂ hybrid nanofibers demonstrated that silica nanoparticles were dispersed moderately in polymer matrix without using any surfactant because interaction of polymer chains caused silica nanoparticles appended on polymer chains hard to agglomerate. Silica nanoparticles and polymer matrix were well compatible, which resulted in the profound enhancement of nanofiber properties.

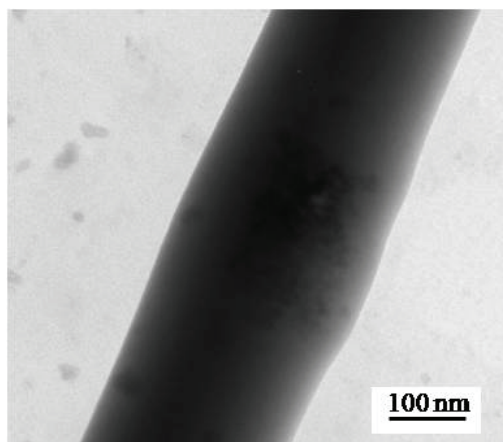


Fig.1. TEM image of polymer/SiO₂ hybrid nanofibers

4. ACKNOWLEDGEMENT

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5. REFERENCES

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