

전기방사된 PET 부직포/PU 복합체의 제조 및 특성

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Characterization and Preparation of Electrospun Poly(ethylene terephthalate) (PET) Nonwoven/Polyurethane (PU) composites

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1. Introduction

Electrostatic spinning or electrospinning has been recently paid attention to prepare ultrafine fiber mats which are composed of diameters in a range of submicrons to nanoscale size[1]. Due to small diameters and porous structure, electrospun fibers have a high specific surface area and expected to use for broad applications, such as filters, membranes, wound dressing materials, artificial blood vessels, a nonwoven fabric, a reinforcement of nanocomposites[2,3], etc.

This study approaches is to prepare and characterize of electrospun poly(ethylene terephthalate) (PET) nowoven/polyurethane (PU) composite for using nanocomposites application.

2. Experimental

Poly(ethylene terephthalate) (PET) chips with intrinsic viscosity (IV) 0.64 were gained from Huvis (Chonju, Republic of Korea). As a solvent, trifluoroacetic acid (TFA) and methylene chloride (MC) are purchased from Showa (Japan) and it used as solvents without further purification. A mixture of TFA/MC is mixed by volume ratio of 50/50 for electrospinning. Polyurethane was obtained from SK Chem (Republic of Korea) and were dissolved in a mixture of tetrahydrofuran (THF)/N, N-dimethylformamide (DMF) by volume ratio of 60/40 as received.

A variable high voltage power supply (CPS-60 k02v1, Chungpa EMT Co., Republic of Korea) is used to prepare electrospun PET nonwoven. Polymer solution were filled into 5 ml syringe. Copper wire connected with a variable high voltage was immersed into polymer solution and charged with the positive charge. The negative charge was grounded to the rotational collector covered by Al-foil. Electrospun PET nonwoven/PU composite were prepared in vacuum.

3. Results and Discussion

Electrospun PET nonwoven were obtained to use the electrospinning process. As the results of

preliminary experimental, electrospun PET nonwoven could be obtained under 15 kV, 15 cm of a tip-to-collector distance and 15 wt% of polymer solution concentration. These governing parameters were fixed during preparing the electrospun PET nonwoven. From the analysis of polymer solution properties, the viscosity and surface tension of polymer solution are 80 cPs and 26 mN/m, respectively. After this solution in electrospun, the average diameters of electrospun PET fiber mats are about 700 nm through image analyzer and the mechanical properties are shown in Figure 1.

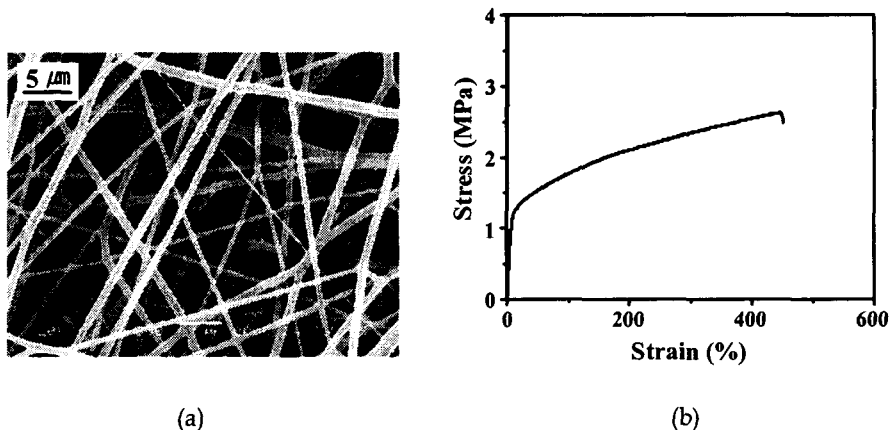


Figure 1. (a) SEM photograph of PET nonwoven electrospun from 15 wt% polymer solution and (b) its mechanical property.

The electrospun fibers or nonwovens have been expected to use as a reinforcement in composite materials. This reason is that nanofibers and nonwoven are able to better mechanical properties than micro fibers. With regard to apply to electrospun PET nonwoven in a field of nanocomposites, electrospun PET nonwoven/PU composites were prepared and characterized.

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4. References

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