

전기방사된 PVC/PU의 기계적 거동

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Mechanical Behaviors of Electrospun Non-woven of PVC/PU blend

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1. Introduction

Thermoplastic polyurethane is a engineering plastic with elasticity, abrasion resistance and good resistance to oil, grease and many solvents. Characteristics of poly(vinyl chloride) (PVC) are good general chemical resistance, excellent weatherability, good insulator properties, and self-extinguishing or flame resistance, etc. So it is used in widespread industrial fields[2].

For many years, polymer fibers are prepared using traditional methods including melt, wet and dry spinning, etc. The diameters of fiber made by these methods range from 10 to 500 μm . However, most recent work has been focused on the preparation of submicrometer fiber with excellent mechanical properties and smooth fiber like skin. Electrospinning, one of few methods, has been great attention because it is unique method for preparing nano fibers[3].

This study is to look into the morphology and mechanical behavior of electrospun PVC/PU non-woven as a function of weight blend ratio.

2. Experimental

2.1. Materials

PVC (degree of polymerization = 800) was obtained form LG Chemical Co.(South Korea) in the form of a powder. PU was used Pellethane 2363-80AE from Dow Co.(USA). As solvents for these materials, *N,N*-dimethylformamide(DMF)/tetrahydrofuran(THF) were used without further purification. Polyblends of PVC/PU by a weight ratio of 100/0 ~ 60/40 were dissolved in a mixture of by a volume ratio of 60/40.

2.2. Electrospinning

A variable high voltage power supply (CPS-60 K02v1, Chungpa EMT Co., South Korea) capable of generating voltage up to 50 kV was used for electrospinning. A metal rotating drum wrapped with aluminum foil was used as the collector. An applied voltage and tip-to-collector distance are fixed at 13 kV, 9 cm, respectively.

2.3. Morphology

The electrospun PVC/PU non-woven was observed with scanning electron microscopy (SEM, GSM-5900, JEOL, Co., Japan). The fiber diameter and its distributions were determined with an image analyzer (Image-proplus, Media Cybernetics Co., USA).

2.4. Mechanical Behavior

The mechanical behavior of electrospun PVC/PU non-woven was examined by a universal testing machine (UTM, AG-5000G, Shimadzu, Japan) with a cross-head speed of 10 mm/min at room temperature. Dumbbell-shaped samples were prepared on the basis of ASTM D638 and five specimens from each blend ratio were tested for tensile test.

3. Results and Discussion

Figure 1 shows the morphology of electrospun PVC/PU non-woven as a function of weight blend ratio of PVC/PU.

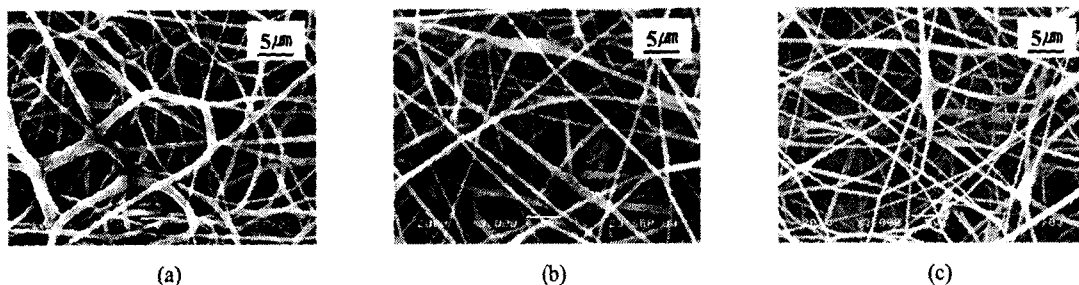


Figure 1. SEM images of PVC/PU blend ratio(w/w); (a) 0/100 (b) 20/80 (c) 40/60

As the blend ratio of PU is increasing, the average diameter is decreasing. This difference of the morphology would show the distinctive difference of mechanical behavior.

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