PHB/PET MB부직포의 구조와 물성에 있어 수용액의 영향

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Effect of Aqueous Solution on the Structure and Physical Properties of PHB/PET MB Nonwovens

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1. Introduction

Recently society has many attention to environment so environmental regulation are much strictured in industrial fields. environmental regulation is no more trend of advanced countries so that it extend to all countries. Accordingly, companies are trying to development the eco-friendly product. Textile companies are not excepted from effort to invent the eco-friendly product.

Major material of textile is almost thermoplastic which is treated by many chemical processes such as dye and finish. So textile companies have many demands for no chemical treatment and eco-friendly product because textile directly contact human body and relatively close to health.

Water dispersible polyester(PHB) is a modified polyester which is dispersed by no chemical and physical treatment. The PHB used in this work is Eastman S85030 polymer which has an equivalent molar mass of 1500 and low melting polyester. We make the PHB, PET mono component nonwoven and PHB/PET bicomponent by meltblown process. Also we investigate the effect of aqueous solution on the structure and physical properties of PHB/PET meltblown nonwoven with different treat time and ph conditions.

2. Experimental

Table 1 is producing conditions of PHB/PET mono and bico meltblown nonwovens. Production conditios of each samples such as spinning temperature, DCD and air temperature are constantly controlled in process but portion ratio are different each other.

Table 1. Producing conditions of meltblown nonwovens.

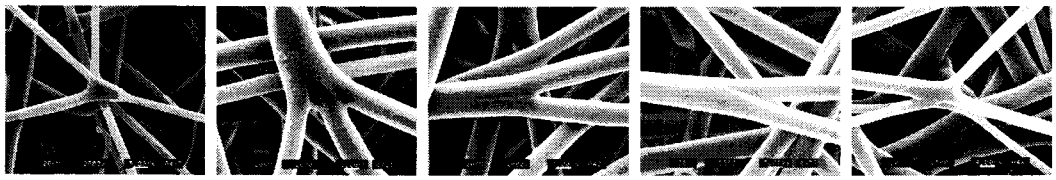
ID	Portion ratio(%)		Spinning temperature (℃)	Air temperature (℃)	DCD (cm)
	PET	PHB			
P1	-	100	280	285	5.1
P2	30	70			5.1
P3	50	50			5.1
P4	70	30			5.1
P5	100	-			5.1

The morphological structure of samples were observed by scanning electron microscope(JSM-6300F, JEOL) and fiber diameters were measured by image analyzing software(IT PRO 3.0, Sometech). Tensile properties of samples carried out by tensile test machine(Instron 4467) with the ASTM D4632 method and air permeability were measured by FX-3300(Textest)tester with KS K 0570(Frazier 'method).

3. Results and discussions

3.1. Morphological structure

Figure 1 shows splitted fibers of MB nonwovens. Mono component fiber diameter is larger than other samples and fiber split less occur. PHB/PET bico meltblown nonwovens have more rough surface which is thicker than mono component meltblown nonwoven. But there are no significant difference of average fiber diameter with treat time. Figure 1 suggests that bico component meltblown nonwovens have too many fiber split to appear the original fiber strength.

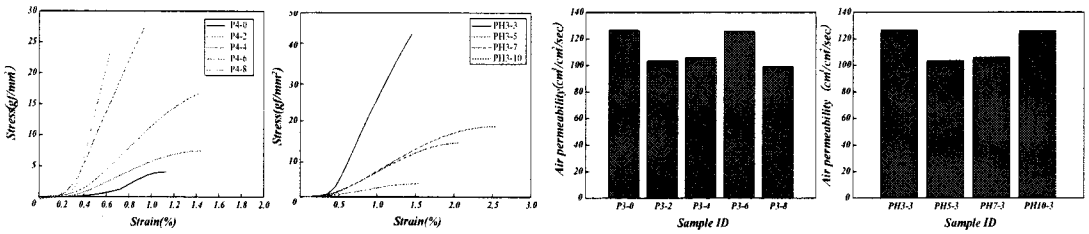


(a) (b) (c) (d) (e)

Figure 1. Splitted fiber of sample(a : P1, b : P2, c :P3, d : P4, e : P5)

3.2 Tensile properties and air permeability

We show that S-S cureves and air permeability of produced samples in Figure 2. As treat time are increased, fiber strength and initial modulus of fibers are increased. But, PH is decreased with increasing tensile strength. Otherwise air permeability is increased as treat time and ph increase.



(a) (b) (c) (d)

Figure 2. S-S curves and air permeability of produced samples
(a, b: S-S curve with treat time and ph, c, d: air permeability with treat time and ph)

4. Conclusions

PHB, PHB/PET mono and bico meltblown nonwoven were successfully made. Produced samples have no significant difference of surface structures with treat time. But there are some decrease of fiber diameter about 2㎛ as ph increase. Also fiber strength and initial modulus are increased with treat time increasing. And air permeability are increased with treat time and ph increasing. To make the meltblown nonwovens constituting PHB resin, we produce the small fiber diameter and low air permeability nonwovens by only aqua and ph treatment. So PHB nonwoven prospect to applicate the filter media and eco-friendly product because PHB is made without chemical treatment to make fine fibers and low air permeability.

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Reference

1. T. Hongu, G. O. Phillips and M. takigami, New millenium fibers, 173-219(2005)