

The Use of Nano agent in Multi-functional finishing on PET fabrics

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1. Introduction

The quality of life comes to be high according to demand of the consumer is becoming diversification. And the Nano-technology will be able to suit in demand of like this consumer's needs. Follows to demand of the consumer where also the textile industry is like this.

With expansion of high functional textile market and the textile industry is growing continuously. Consequently textile product developments must concentrate in the high value product.

Currently domestic functional finishing in case is professionalized in water-, oil- repellency and anti-microbial, anti-static etc. one kind function.

Purpose of this study was a multi-functional finishing technique development about the PET fabrics and diversification and high value of the functional textile product leads and market magnification of the functional textile product.

2. Experimental

2.1. Materials

Multifunctional, water and oil repellent, anti-static, anti-microbial and UV-cut finishes for PET fabrics were prepared from nano-sized functional agents. Water and oil repellent agent was acrylic type and durable monomer (HTBO) was applied [Fig. 1]. Carbon Nano Tubes (CNTs) were used for anti-static finishing. Anti-microbial agent was nano-silver type mingled with chitosan. UV cutting agent was supplied from Nicca Korea.

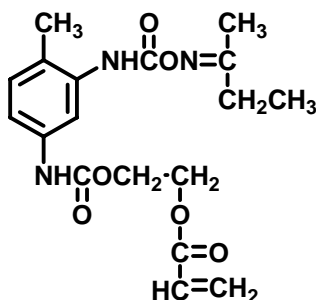


Figure 1. Structure of durable monomer (HTBO)

2.2. Multi-functional finishing process

Multi-functional finishing from the process of two times was advanced. First, anti-microbial finishing process and UV-cut finishing process were treated simultaneously with pad-dry-cure method. In after words, the water repellency and anti-static finishing was controlled simultaneously with one-side process in a kiss-roll coating method.

2.3. Efficiency Tests

The water repellency was also characterized by comparing with American Association of Textile Chemists and Colorists (AATCC) standard spray test chart. Angle of contact was measured with Video-based Contact Angle Meter (OCA-20 / Data Physics / Germany). And the oil repellency was evaluated according to AATCC 118 standards.

Surface charge of finished fabrics was measured with KANEBO EST-7 (Japan).

Anti-microbial property was evaluated according to reduction ratio of colonies (KS K 0693 ; Staphylococcus aureus, Klebsiella pneumoniae).

UV-blocking property was measured with UV-Vis.-NIR spectrophotometer (Cary-5000 / Varian / Australia)

3. Results and Discussions

3.1. Water repellency

Table 1 shows the water repellency of conventional water repellent agent and water repellent agent which is applied HTBO. Both agents shown initial ratings 100 in the spray test. But in case of water repellent agent which is applied HTBO had relatively good durability after launderings.

Table 1. Water repellency after launderings

water repellent agent	Times of launderings					
	0	5	10	15	20	25
Conventional	100	70	70	70	50+	50-
HTBO	100	80+	80	70+	70	50+

Fig. 2 shows contact angles of water on the fabric which treated with water repellent agent. In case of only water repellent agent treated fabric, contact angle was 137.7° . When but applying the nano particle in here to, increased the contact angle at 142.5° .

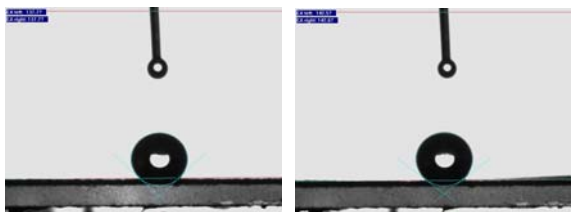


Figure 2. Contact angles of water repellent finishing fabrics

3.2. Multi-functional finishing

Anti-microbial and UV cut finishing was treated by padding system. Treated fabric was coated with dispersed solution of water repellent agent and CNTs. Like this multi-functional fabric was tested about various efficiencies such as water repellency, anti-static, anti-microbial, UV-blocking property.

Table 2 shows the water repellency of multi-functional finishing fabric. Initial rating was 100 in the spray test and showed good durability after 10 times launderings.

Table 2. Water repellency of multi-functional finishing fabric after launderings

Multi-functional finishing fabric	Times of launderings					
	0	5	10	15	20	25
Rating of Water repellency	100	100	100	90+	90+	90-

Fig. 3 shows anti-static property of multi-functional finishing fabric. In case of 2% (conc. of CNTs) treated fabric showed surface charge at 0.98 Kv. Consequently knew that also multi-functional fabric has anti-static property.

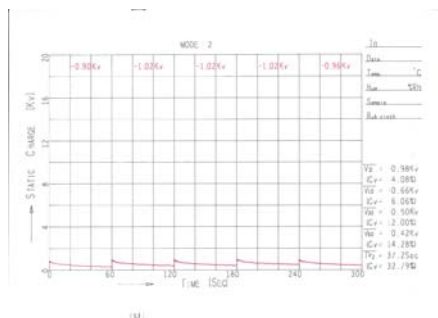
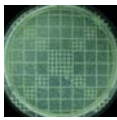
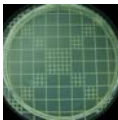
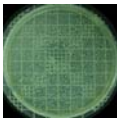
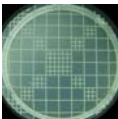


Figure 3. Surface charge of finished fabric with CNTs.

Table 4 shows anti-microbial property of multi-functional finishing fabric. About two specimens, reduction ratio of colonies was very excellent at 99.99%.

Table 4. Anti-microbial property of multi-functional finishing fabric

	Reduction ratio of colonies	
	Blank	Treated
Staphylococcus aureus		 99.99 %
Klebsiella pneumoniae		 99.99 %

Transmittance (%) of ultra-violet rays was measured by UV-Vis.-NIR spectrophotometer. The result of measurement, ultraviolet rays did not pass the multi-functional fabric. Blocking rate of UV was 99.7 % or more.

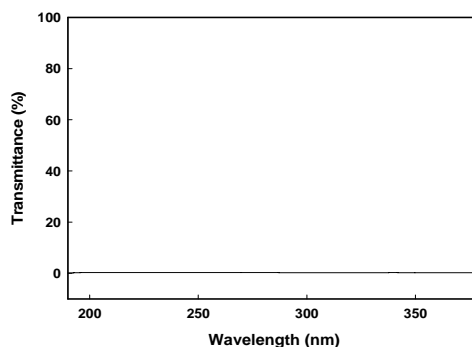


Figure 4. UV-transmittance of multi-functional fabric

4. Conclusions

The purpose of this study was to give multi-functional properties on PET fabric. For the water repellency, treated fabric showed good durability after 10 times launderings. And it showed surface charge at 0.98 Kv, reduction ratio of colonies 99.99%, transmittance of UV at 0.3 %. All test result got a satisfied result.

5. Acknowledgement

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