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ABSTRACT

Saha R (2012) Effect of temperature in wettability on PET Fabric. *J. Innov. Dev. Strategy.* 6(2), 53-55.

Polyesters as thermoplastics may change shape after the application of heat. While combustible at high temperatures, polyesters tend to shrink away from flames and self-extinguish upon ignition. Here PET fabric is impregnated with Soil Release Polymer (SRP) and then thermofixed with seven different temperature fabrics are also observed, before and after SRP. The phenomena of wetting behaviour is precisely observed after SRP-impregnation and after thermofixing with different temperature. The results obtained correlated with the wettability of polyester fabric in heat-set PET fabrics before and after deposition of Soil Release Polymer (SRP).

Key words: *thermofixing, wettability, polyester fabric, Soil Release Polymer (SRP)*

INTRODUCTION

Polyester has been one of the most popular, second to cotton as measured by production tonnage in recent years. The technical merits and commercial versatility of the fiber production system have led to successful product development and applications (You-Lo 2009).

The material commonly known as polyester, polyethylene terephthalate (PET), is actually only group of polymers containing ester functional group. Polyesters as thermoplastics may change shape after the application of heat, while combustible at high temperature, polyesters tend to shrink away from flames and self-extinguish upon ignition.

Here SRP modification and thermofixing is done to observe the change in absorption rate, spreading rate and contact angle which can influence the wettability.

MATERIALS

A polyester test fabric was used as substrate for this study. The fabric was supplied by Wfk-Testgewebe GmbH, Krefeld, Germany. The material was used as it received without any pretreatment. Different parameter of the test fabric is given in Table 1.

Table 1. Specifications of polyester fabric

Parameter	Value
Fineness (warp)	295 dtex
Fineness (weft)	295 dtex
Yarn density (warp)	270 +/- 5 yarn / dm
Yarn density (weft)	270 +/- 5 yarn / dm
Width	80 cm
Fabric weight	170 g/m^2
Weave	1 / 1 plain

EXPERIMENT

Heat setting

Heat setting is the thermal process of imposing permanent dimensions upon thermoplastic textiles and materials by the action of heat, with or without steam. For this thesis, the fabrics were heat-setted at 170°C, 180°C, 190°C, 200°C, 210°C, 220°C and 240°C for 60 seconds (Saha 2010).
For heat setting a lab dryer 300°C (Mathis, Switzerland) was used.

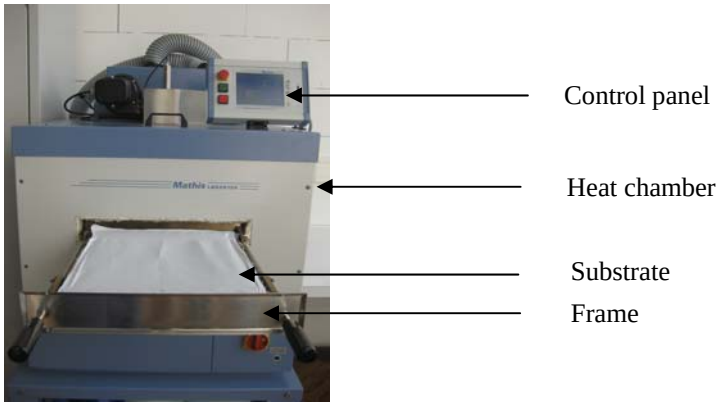

Fig. 1. Mathias Lab dryer, Switzerland

RESULTS AND DISCUSSION

In this thesis PET fabrics were modified with NH_3- and O_2-plasma using different treatment durations. Impregnation with Soil Release Polymer (SRP) and heat-setting by seven different temperatures i.e. 170°C, 180°C, 190°C, 200°C, 210°C, 220°C and 240°C were used.

Table 2. Wettability of thermofixed PET fabric

Temperature	SRP				Without SRP	
	Spreading rate (mm/sec)		Absorption rate (µl/sec)		Contact angle (°)	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
170°C	2.53	0.39	0.53	0.26	113.34	2.12
180°C	2.80	0.54	0.06	0.01	117.79	3.11
190°C	2.77	0.44	0.04	0.01	118.04	3.99
200°C	2.94	0.73	0.03	0.01	122.11	4.49
210°C	2.33	0.58	0.04	0.01	120.79	4.82
220°C	1.38	0.55	0.40	0.08	116.24	5.04
240°C	11.89	2.00	15.05	3.58	116.03	3.00

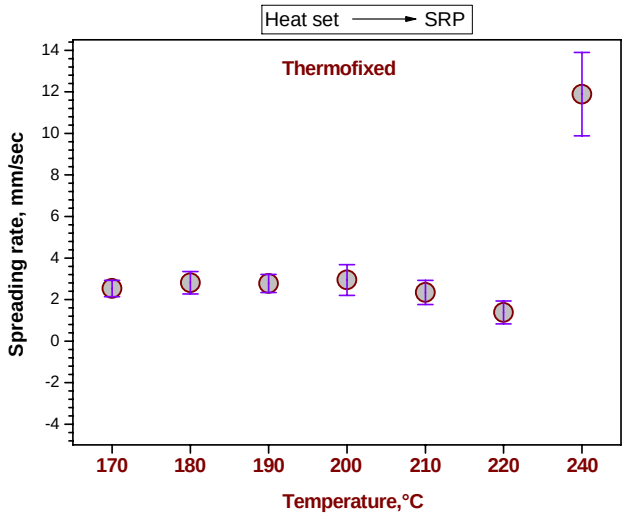

Fig. 2. Spreading rate of thermofixed fabric

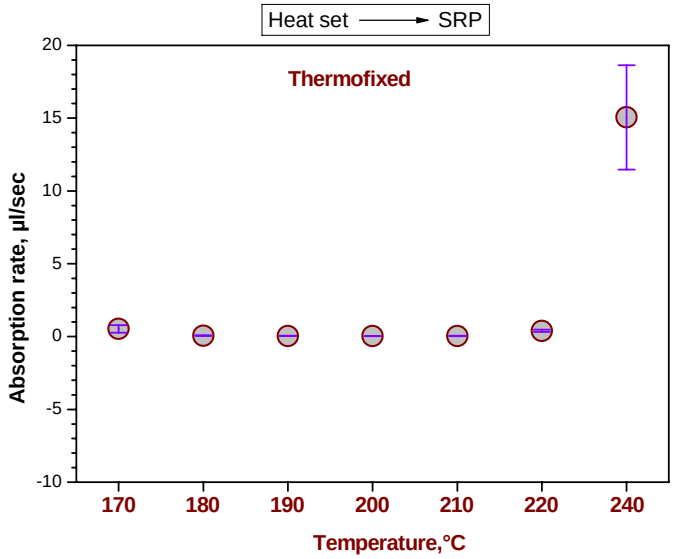

Fig. 3. Absorption rate of thermofixed fabric

SRP-impregnation leads to surface hydrophilisation, according to Fig. 2 and Table 2. Spreading rates are about 2 mm/sec by all fabrics, with the exception of the fabric thermofixed at 240°C, which shows an extremely high spreading rate of 11.9 mm/sec. Same effect of high hydrophylisation by SRP-impregnation was observed by measured absorption rate of fabric thermofixed at 240°C in Fig. 3.

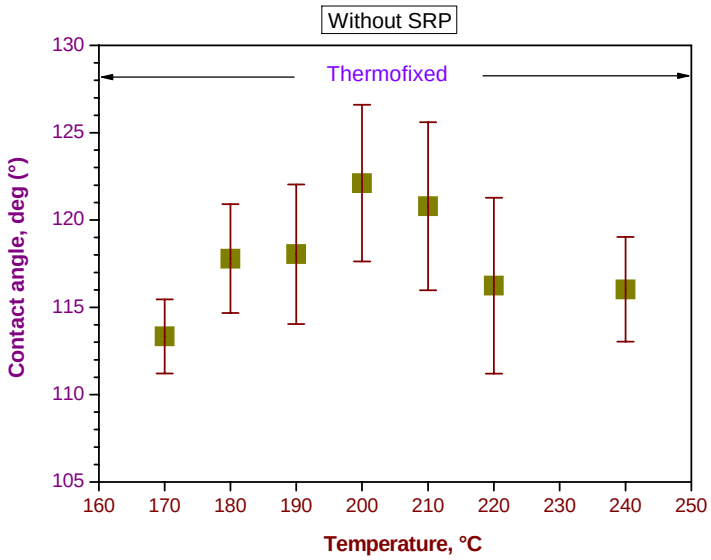

Fig. 4. Cover factor of thermofixed PET fabric

According to Table 2 and Fig. 4, thermofixed surfaces are all hydrophobic, that means, no spreading or water absorption occurred. The effect of thermosetting increases hydrophobicity from 113° contact angle by fabric thermofixed at 170°C up to 122.1° contact angle by thermofixed at 200°C.

CONCLUSION

The objective of present study is to observe how themofixing after Soil Release Polymer (SRP) impregnation improve the wetting behaviour of PET fabric. It was identically seen that only spreading rate is little bit improved but there was no significant improving in absorption rate. On the other hand without SRP-impregnation the contact angle is improved clearly than after SRP ones. So it is clear that without SRP.

REFERENCES

Saha R (2010) “Roughness-induced capillary uptake of liquids into textile structures”, Master thesis, Technische Universität Dresden, Germany.

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