

Soil-resistant property of polypropylene fiber containing synthetic compounds

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Polypropylene (PP) fiber is the lightest among synthetic fibers and has many merits, such as water-repelling property. Because poly-di-methyl-siloxane (PSx) and oleamide (OA), which are synthetic compounds, have little free energy, they have an advantage of repelling soiling substances. Therefore, to improve the soil-resistant property of PP fibers, an attempt was made to add these synthetic compounds to PP fibers. The synthetic compounds enhanced the water- and oil-repelling properties of PP fibers, which became less readily soiled. In addition, the synthetic compounds made PP fibers markedly more resistant to wear than those without the synthetic compounds. The synthetic compounds were believed to act as a lubricant for friction terminals of PP fibers.

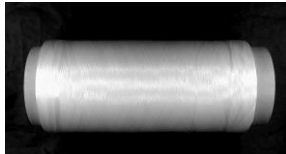


Fig. Aspect of spun PP

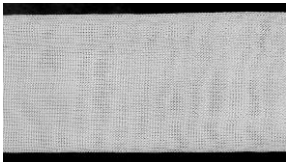
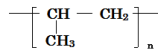
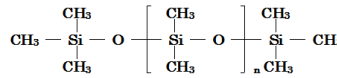


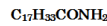
Fig. Knitted fabric made of PP fiber containing PSx



Polypropylene



Poly-di-methyl-siloxane



Oleamide

Fig. Chemical structure of samples

Table Composition of blended samples

	A	E	L	G
Polypropylene (wt%)	100.00	90.00	99.85	89.85
Poly-di-methyl-siloxane (wt%)	0.00	10.00	—	10.00
Oleamide (wt%)	—	—	0.15	0.15

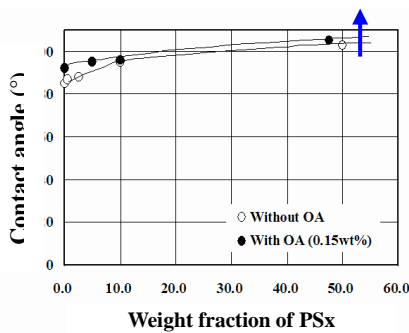


Fig. Relationship between contact angle for distilled water and weight fraction of poly-di-methyl-siloxane

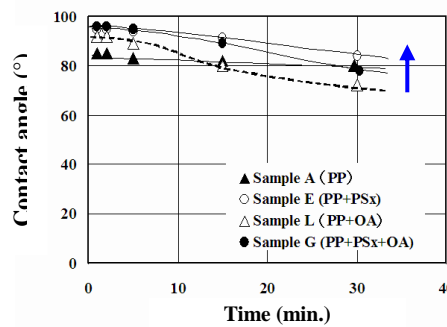


Fig. Time dependence of contact angle of distilled water for different

Composition of water-soluble soil

Carbon Black	10.0wt%
Polyvinyl alcohol	4.0wt%
Distillation water	86.0wt%

Composition of oil-soluble soil

Carbon Black	0.05wt%	0.10wt%
Beef tallow	0.12wt%	0.12wt%
Liquid paraffin	0.37wt%	0.37wt%
Carbon tetrachloride	99.5wt%	99.4wt%

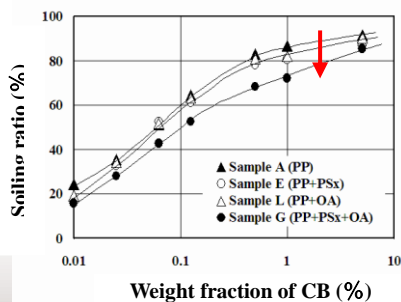


Fig. Relationship between soiling ratio and weight fraction of Carbon Black dissolved in water

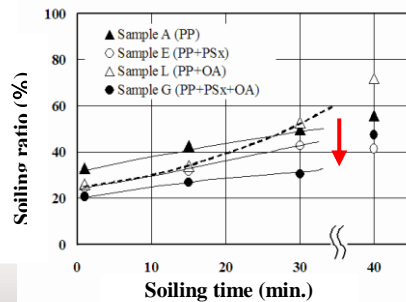


Fig. Relationship between soiling ratio and soiling time for water soluble soil

Table Abrasion property for different Polypropylene fabrics by abrasion tester

	Before abrasion	After abrasion (times)		
		10	20	Maximum
Sample A (PP)				23 times
Sample E (PP+PSx)				>100 times
Sample G (PP+PSx+OA)				>100 times