

## 침구류에 사용되는 황토염색 면직물에 관한 연구

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### A study on the dyed cotton fabrics with loess for bedspreads

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#### 1. Introduction

In these days, it is actively investigated to use loess in textile industry. The loess have been reported for emissivity of far-infrared and negative ion, and antibacterial efficacy. The loess consist of quartz, feldspar, clay mineral, iron oxide mineral, gibbsite  $[Al(OH)_3]$ , etc. The main component of loess is clay minerals which have great adsorption about ion exchange and far-infrared emission properties. Recently, various inner-wears, sheets, and interior goods are manufactured using the loess due to its improved blood circulation, metabolism, antibacterial and deodorizing properties. In this study, we treated nano-silver colloids on cotton fabrics after dyed loess and discussed to emissivity of far-infrared and negative ion and evaluated antibacterial efficacy.

#### 2. Experimental

The cotton fabrics used in this experiment were white cotton fabrics (KS K 0905). Dyed cotton fabrics with loess were taken from Choices Textile Design Studio Co., Ltd. The nano-silver colloids were taken NP-Tech. Co., Ltd. All the cotton fabrics used in this work were dyed by loess. After, the cotton fabrics were treated nano-silver colloids by a normal pad method. This experiment were treated by kinds of NSW(Nano Silver in Waterbase), NSE(Nano Silver in Ethanolbase), and SNSE(Nano Silver compound in Ethanolbase). This solutions were padded with 5ppm , 20ppm and dried at 120°C.

Light colorfastness on the dyed cotton fabrics with loess were measured according to KS K 0218 using xenon arc lamp. Washing colorfastness were measured according to A1 of KS K 0430 (40°C×30min) using launder-o meter. Perspiration colorfastness were measured according to KS K 0715 (acid, alkali). Rubbing colorfastness were measured according to KS K 0650 using crock meter. Far-infrared were tested by sample size of 30×30mm, between sample and distance of incidence of 12cm, temperature of measure were tested at 40°C, and setting time at over 2hr. (Model: FT-IR, Nicolet USA), blackbody(Model: Infrared systems. USA). Negative ion were tested sample size of 200×100mm, the distance of measure of 15cm, and time of measure were tested at 1hr (Model: Air Ion counter, Fisa, Japan). Antibacterial efficacy were tested according to AATCC 100 test method with *Staphylococcus aureus* (ATCC 6538) and *Klebsiella pneumoniae* (ATCC 4352).

#### 3. Results and Discussion

Colorfastness of the dyed cotton fabrics with loess showed good grade. Colorfastness of washing and perspiration were indicated a consequence of high grade. On the other hand, emissivity of negative ion have no effect in comparison with blank in air. Table 1. shows antibacterial efficacy of the treated nano-silver colloids on the dyed cotton fabrics with loess. The antibacterial efficacy

were most improved on the cotton fabrics through the treated nano-silver colloids. The result of antibacterial efficacy compared with of between untreated samples and treated samples with nano-silver colloids. Percent reduction of bacteria of untreated sample against *Staphylococcus aureus* and *Klebsiella pneumoniae* were showed low by each 17.5%, 39.5%. On the other hand, the percent reduction of bacteria of the treated cotton fabrics with nano-silver colloids were most indicated a high percentage. In the result of antibacterial efficacy, it was revealed that the treated cotton fabrics with nano-silver colloids had excellent antibacterial activity.

#### 4. Conclusion

In this paper, the cotton fabrics were dyed with loess and padded with the nano-silver colloids. The dyed cotton fabrics with loess showed high grade in colorfastness. The emissivity rate and emissivity energy of far-infrared were showed a slight increase than those of the untreated sample. As the results tested, negative ion were not indicated significant effect about loess and nano-silver colloids. The antibacterial property of cotton fabrics treated with the nano-silver colloids were strongly improved.

#### 5. Reference

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Table 1. Antibacterial efficacy of the treated cotton fabrics with nano-silver colloid and loess

Bacteria		<i>Staphylococcus aureus</i>			<i>Klebsiella pneumoniae</i>		
	Sample	Untreated	5ppm	20ppm	Untreated	5ppm	20ppm
NSW	Start	$1.2 \times 10^5$	$1.2 \times 10^5$	$1.2 \times 10^5$	$1.4 \times 10^5$	$1.4 \times 10^5$	$1.4 \times 10^5$
	After 24hr	$6.1 \times 10^7$	$4.8 \times 10^7$	$2.8 \times 10^7$	$6.5 \times 10^7$	$8.1 \times 10^6$	<10
	% reduction of bacteria	-	22.1	54.1	-	87.6	99.9
NSE	Sample	Untreated	5ppm	20ppm	Untreated	5ppm	20ppm
	After 24hr	$6.1 \times 10^7$	<10	<10	$6.5 \times 10^7$	$1.3 \times 10^5$	$1.3 \times 10^5$
	% reduction of bacteria	-	99.9	99.9	-	99.8	99.8
SNSE	Sample	Untreated	5ppm	20ppm	Untreated	5ppm	20ppm
	After 24hr	$6.1 \times 10^7$	<10	<10	$6.5 \times 10^7$	$3.9 \times 10^7$	<10
	% reduction of bacteria	-	99.9	99.9	-	40.5	99.9