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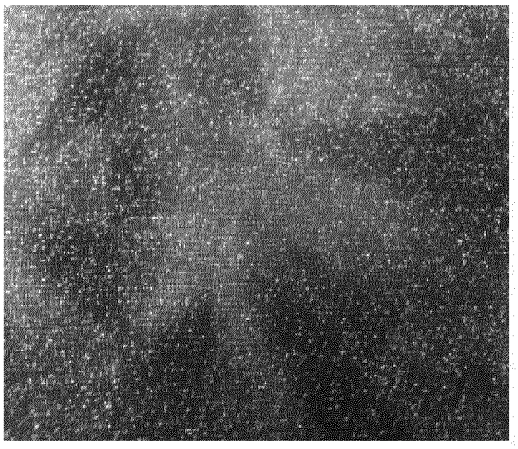
(54) METHOD FOR DYEING TEXTILES USING METALLIC YARN AND POLYESTER YARN AND TEXTILE MANUFACTURED THEREBY

(57) A method for manufacturing dyed woven or knitted fabric includes preparing woven or knitted fabric using metallic yarn and normal-pressure dyeing polyester yarn having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40%, fabricating a dye bath by putting a dye solution obtained by dispersing a dye in water, dyeing the woven or knitted fabric by putting the prepared woven or knitted fabric into the fabricated dye bath, raising a temperature of the dye bath starting from 35 to 45°C for 30 to 50 minutes at a rate of 1.2 to 1.5 °C/min, and maintaining the heated dye bath at 90 to 100°C for 15 to 25 minutes, and washing the dyed woven or knitted fabric. The dyed woven or knitted fabric has a light reflection reduction rate of 20% to 30%.

FIG. 2



EP 2 781 647 A1

Description

Field of the Disclosure

[0001] The present disclosure relates to a method for manufacturing dyed woven or knitted fabric using metallic yarn and polyester yarn, and woven or knitted fabric manufactured using the dyeing method.

Description of the Related Art

[0002] The present disclosure relates to a method for manufacturing dyed woven or knitted fabric using a material obtained by interlacing, twisting or covering metallic yarn and polyester yarn, and more particularly, to a method for manufacturing dyed woven or knitted fabric using metallic yarn and polyester yarn, which may maintain metallic glass without damaging the metallic yarn or contaminating a dye with the metallic yarn even though woven or knitted fabric prepared using a material obtained by interlacing, twisting or covering metallic yarn and normal-pressure dyeing polyester yarn is dyed by means of a normal-pressure dyeing process in a fabric-dyeing manner by using a disperse dye.

[0003] In order to form metallic yarn, metallic film members are configured to include a resin coating layer formed on one surface of a transparent base film of polyester yarn and a metallic layer formed thereon by depositing metal such as gold, silver or copper, and then the metallic film members are adhered to each other by using an adhesive so that an adhesive layer is formed at a portion where the metallic layers face and contact each other and the transparent base film exposes outwards. The metallic yarn has excellent gloss characteristic and electrostatic shielding characteristic since it is made by interlacing, twisting, covering fibers such as cotton, wool, silk, nylon, acryl, polyester or the like and then weaving or knitting the fibers, and thus is widely used for various functional materials such as party wears, electrostatic shielding wears, shape memory clothes or the like.

[0004] The existing technique uses a yarn-dyeing manner in which polyester yarn is dyed first, then interlaced, twisted or covered, and then made into woven or knitted fabric. However the yarn-dyeing manner requires many processes, which deteriorates efficiency and productivity and loses market competitive power due to high production costs. Meanwhile, a fabric-dyeing manner, in which metallic yarn and polyester yarn are woven to make woven or knitted fabric and then a dyeing process is performed, has the following problems. Different from other materials interlaced, twisted or covered together with metallic yarn, polyester is generally dyed for 60 to 80 minutes under high-temperature and high-pressure conditions with a final temperature of 120 to 130°C by using a disperse dye due to the nature of the fiber. The dyeing process performed under such conditions may cause separation of the metallic layer on the woven or knitted fabric, and contamination or deformation of the dye by the metallic layer, after the dyeing process, which deteriorates the quality of the woven or knitted fabric and results in losing most gloss, which is an inherent property of metal.

[0005] In order to solve this problem, there has been proposed a method for preventing separation or discoloration of metallic yarn by using heat-resistant polyurethane material as an adhesive to improve the metallic yarn manufacturing process (Korean Patent Registration No. 10-955517), but this cannot be a fundamental solution against the problem in which polyester dye components are contaminated by metallic yarn. Meanwhile, there has also been proposed a method for preventing dye adsorption when a fabric-dyeing process is performed with a disperse dye by additionally forming a resin coating layer using an epoxy resin or a melamine resin on the surface of a metallic layer (Korean Patent Registration No. 10-656184), which however cannot solve the problems in relation to costs and deformation, caused by the additional process.

SUMMARY OF THE DISCLOSURE

[0006] The present disclosure is directed to providing a method for maintaining clarity without deteriorating quality due to separation or deformation of metallic yarn or contamination of the metallic yarn even though woven or knitted fabric is prepared using a material obtained by interlacing, twisting or covering metallic yarn and polyester yarn and then dyed with a disperse dye by a fabric-dyeing process, and woven or knitted fabric manufactured by the method.

[0007] In one aspect of the present disclosure, there is provided a method for manufacturing dyed woven or knitted fabric, which includes preparing woven or knitted fabric using metallic yarn and normal-pressure dyeing polyester yarn having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40%; fabricating a dye bath by putting a dye solution obtained by dispersing a dye in water; dyeing the woven or knitted fabric by putting the prepared woven or knitted fabric into the fabricated dye bath, raising a temperature of the dye bath starting from 35 to 45°C for 30 to 50 minutes at a rate of 1.2 to 1.5 °C/min, and maintaining the heated dye bath at 90 to 100°C for 15 to 25 minutes; and washing the dyed woven or knitted fabric.

[0008] In addition, the method for manufacturing dyed woven or knitted fabric according to the present disclosure may further include, before dyeing the woven or knitted fabric, preprocessing the prepared woven or knitted fabric at 75 to 85°C for 15 to 25 minutes by using a de-oiling agent before the prepared woven or knitted fabric is put into the dye bath.

[0009] The dye solution may include at least one of glacial acetic acid, a dispersing agent, a softening agent, a stain repellant, and their mixtures.

[0010] In another aspect of the present disclosure, there is also provided dyed woven or knitted fabric having a light reflection reduction rate of 20% to 30%.

[0011] According to the present disclosure, the woven or knitted fabric prepared using a thread obtained by interlacing, twisting or covering normal-pressure dyeing polyester yarn and metallic yarn may maintain inherent clear gloss and quality of the metallic yarn since the metallic yarn is not separated or deformed and also not contaminated by a dye even though a dyeing process is performed at a final temperature of 90 to 100°C for 15 to 20 minutes with a disperse dye.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a photograph showing a knitted work dyed using a general polyester material.

Fig. 2 is a photograph showing a knitted work dyed according to an embodiment of the present disclosure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] Hereinafter, preferred embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Prior to the description, it should be understood that the terms used in the specification and the appended claims should not be construed as limited to general and dictionary meanings, but interpreted based on the meanings and concepts corresponding to technical aspects of the present disclosure on the basis of the principle that the inventor is allowed to define terms appropriately for the best explanation.

[0014] A method for manufacturing dyed woven or knitted fabric according to the present disclosure includes preparing woven or knitted fabric using metallic yarn and normal-pressure dyeing polyester yarn having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40%; fabricating a dye bath by putting a dye solution obtained by dispersing a dye in water; dyeing the woven or knitted fabric by putting the prepared woven or knitted fabric into the fabricated dye bath, raising a temperature of the dye bath starting from 35 to 45°C for 30 to 50 minutes at a rate of 1.2 to 1.5 °C/min, and maintaining the heated dye bath at 90 to 100°C for 15 to 25 minutes; and washing the dyed woven or knitted fabric.

[0015] First, woven or knitted fabric is prepared using metallic yarn and normal-pressure dyeing polyester yarn having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40%.

[0016] The metallic yarn employed in the present disclosure is prepared through a slitting process by coating a polymer film with a metal to have a size of 0.15 to 5 mm or prepared by coating general yarn with a metal. The metal may use gold, silver, nickel, germanium or the like, and any metallic material having functionality such as peculiar color or electric conductivity may be used without special limitation. The polymer film coated with a metal may use polymer material such as nylon, polyester, polyurethane, polyethylene or the like, and the general yarn may use natural fiber such as cotton, wool, linen, silk or the like, synthetic fiber such as nylon, polyester, acryl, polyurethane or the like, or semi-synthetic fiber such as acetate, lyocell or the like, without being limited thereto. The general yarn may be coated with a metal by using any method known in the art, for example ion plating, electroless plating, sputtering, coating, spraying or the like.

[0017] The normal-pressure dyeing polyester yarn having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40%, employed in the present disclosure, may be obtained by changing orientation and crystal structure of molecular chains by ultrahigh speed spinning or introducing copolymer material such as hydrocarbon derivative to main chains by means of copolymerization, or may use polyester fiber prepared by spinning polyethylene terephthalate and polytrimethylene terephthalate in mixture.

[0018] If the normal-pressure dyeing polyester yarn of the present disclosure has an elasticity modulus less than 400 kg/mm^2, fabric made of the yarn has deteriorated elasticity due to bad mechanical properties. If the elasticity modulus exceeds 600 kg/mm^2, the dyeing quality is not good. In addition, the normal-pressure dyeing polyester yarn of the present disclosure may have an elongation of 30 to 40%.

[0019] In order to prepare the woven or knitted fabric by using metallic yarn and polyester yarn, any method may be used without special limitation. For example, after forming a piece of thread by means of interlacing, covering or twisting, the woven or knitted fabric may be prepared by weaving the thread, as well known in the art. Here the woven fabric is prepared according to an existing weaving method by means of plain weaving, twilling or satin weaving depending on its usage, by using the fabricated thread as a part of warp or weft. The knitted fabric may be prepared by knitting the fabricated thread by means of sweater knitting, circular knitting or tricot stitching depending on its usage, to have various fabrics such as double-sided fabric, single-sided fabric, fraise fabric, towel fabric, terry fabric, jacquard or the like. Both the woven fabric and the knitted fabric may be used.

[0020] In detail, in the twisting process, metallic yarn and normal-pressure dyeing polyester yarn are twisted by a

twisting machine in a "S" or "Z" according to the use of the fabric in a MX manner within the range of 350 to 700 TPM. The dimension of available polyester yarn is within a range of 75D to 150D, the metallic yarn has a range of 0.15 to 5.0 mm, and a ratio of the normal-pressure dyeing polyester yarn to the metallic yarn may be 1:1 or 1:2 in the twisting process.

[0021] In addition, it is also possible to use the metallic yarn as a core yarn and the normal-pressure dyeing polyester yarn and other yarn as auxiliary yarns so that the core yarn and the auxiliary yarn are twisted together by a twisting machine for interlacing or making a covered yarn.

[0022] After that, a dye solution obtained by dispersing a dye in water is put to fabricate a dye bath.

[0023] For dyeing, a fabric-dyeing process may be directly performed to the prepared woven or knitted fabric instead of a yarn-dyeing process, which may shorten the process time and ensure excellent fabric quality.

[0024] In the present disclosure, among many kinds of dyes for polyester, it has been found through tests that C.I. Disperse Yellow 54, C.I. Disperse Red 60, C.I. Disperse Blue 56, Disperse Black D-RE or the like may be used alone or mixed suitably according to a demanded color.

[0025] The dye solution may include a small amount of glacial acetic acid, a dispersing agent (a dispersing agent based on polyoxyethylene oxide alkylalcohol), a softening agent (an emulsion obtained by performing emulsification dispersion to ester-based elastic polymer), and a stain repellant (polyoxyethylene nonyl phenylether).

[0026] In addition, the method of the present disclosure may selectively further include a preprocessing process for treating the prepared woven or knitted fabric at 75 to 85°C for 15 to 25 minutes by using a de-oiling agent (fatty alcohol polyglycol ester and ether) before the prepared woven or knitted fabric is put into the dye bath.

[0027] After that, the prepared woven or knitted fabric is put into the fabricated dye bath, the temperature of the dye bath is raised starting from 35 to 45°C for 30 to 50 minutes at a rate of 1.2 to 1.5 °C/min, and the heated dye bath is maintained at 90 to 100°C for 15 to 25 minutes, thereby dyeing the woven or knitted fabric.

[0028] The amount of the used dye is 3 to 5% (o.w.f 3 to 5%) in comparison to the weight of fiber, and the amount of the dye bath is set to be 20 times of the weight of fiber (a bath ratio is 20:1). After the prepared woven or knitted fabric is put into the dye bath, the temperature is raised starting from 35 to 45°C for 30 to 50 minutes at a rate of 1.2 to 1.5 °C/min, and a final temperature is maintained at 90 to 100°C for 15 to 20 minutes according to the dyeing color.

[0029] A final temperature of a general dyeing process is 120°C or above since a general polyester yarn is not dyed commercially usefully at a temperature lower than 120°C. However, the dyeing process of the present disclosure is performed at a final temperature of 90 to 100°C. Since the present disclosure uses the normal-pressure dyeing polyester yarn having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40%, commercially useful dyeing may be performed at the final temperature of 90 to 100°C. In addition, the metallic yarn may be deformed when being heated to 120°C or above. However, since the dyeing process may be performed at a low final temperature in the present disclosure, the dye is not contaminated by the metallic yarn, which ensures excellent color development of the polyester portion and allows the metallic yarn to maintain inherent gloss. Therefore, the characteristics of the original material may be exhibited without damage.

[0030] In addition, the present disclosure provides dyed woven or knitted fabric, which is manufactured by the above method and has a light reflection reduction rate of 20% to 30%.

Equation 1

$$\text{Photo - reflection reduction rate } (\%) = \frac{(\text{reflectivity of the metallic yarn before dyeing - reflectivity of the metallic yarn after dyeing})}{\text{reflectivity of the metallic yarn before dyeing}} \times 100$$

[0031] The light reflection reduction rate of the present disclosure may be calculated by measuring reflectivity of the metallic yarn before and after dyeing as shown in Equation 1 above, and the gloss maintenance of the metallic yarn may be quantified through the light reflection reduction rate. The metallic yarn of the dyed woven or knitted fabric according to the present disclosure has a light reflection reduction rate of 20 to 30%, which is very excellent. This is because the dyeing process may be performed at a low final temperature, and thus the dye is not contaminated by the metallic yarn, which ensures excellent color development of the polyester portion, allows the metallic yarn to maintain inherent gloss, and thus exhibits the characteristics of the original material without damage. The light reflection reduction rate may be measured using a spectrophotometer.

[0032] Hereinafter, the present invention will be explained in detail with reference to embodiments. The embodiments of the present invention, however, may take several other forms, and the scope of the invention should not be construed as being limited to the following examples. The embodiments of the present invention are provided to more fully explain the present invention to those having ordinary knowledge in the art to which the present invention belongs.

Examples

Example 1. Low-temperature dyeing method using normal-pressure dyeing polyester yarn having an elasticity modulus of 400 kg/mm^2 and an elongation of 38%

[0033] Normal-pressure dyeing polyester yarn (FDY 110D/36F CBR, Ji-Young Trading) having an elasticity modulus of 400 kg/mm^2 and an elongation of 38% and metallic yarn (1/100", polyester metallic yarn, MX Type, Seoheung Industry) were put together and twisted at 400 TPM to make a thread. By using the thread, a knitted work of single fabric was made by means of a circular knitting machine.

[0034] C.I Disperse Yellow 54 (Lumacron Yellow E3G), C.I Disperse Red 60 (Lumacron Red FB), C.I. Disperse Blue 56 (Lumarcron Blue FBLE), Disperse Black D-RE (Lumacron Black) dye, 0.5 g/L of glacial acetic acid, 0.5 g/L of dispersing agent (polyoxyethylene oxide alkylalcohol) and 0.5 g/L of softening agent (an emulsion obtained by performing emulsification dispersion to ester-based elastic polymer), and 0.5 g/L of stain repellant (polyoxyethylene nonyl phenylether) were added to water to make a dye bath.

[0035] For dyeing in yellow, C.I Disperse Yellow 54 and C.I Disperse Red 60 were mixed and used. For dyeing in pink, C.I Disperse Red 60 1.5g/L and C.I Disperse Yellow 54 were mixed and used. For dyeing in black, Disperse Black D-RE and C.I Disperse RED 60 were mixed and used. The amount of dye used is 3% (o.w.f) in comparison to the weight of fiber, and the amount of the dye bath was 20 times of the weight of fiber (a bath ratio 20:1). After the prepared woven or knitted fabric is put into the dye bath, the temperature is raised starting from 40°C for 40 minutes at a rate of 1.5 °C/min, and a final temperature is maintained at 100°C for 20 minutes. The dyed fabric was washed and then dried.

Example 2. Low-temperature dyeing method using normal-pressure dyeing polyester yarn having an elasticity modulus of 600 kg/mm^2 and an elongation of 33%

[0036] Dyed woven or knitted fabric was prepared in the same way as Example 1, except that normal-pressure dyeing polyester yarn (FDY 110D/36F CBR, Ji-Young Trading) having an elasticity modulus of 600 kg/mm^2 and an elongation of 33% was used.

Comparative Example 1. Low-temperature dyeing method using general polyester yarn having an elasticity modulus of 900 kg/mm^2 and an elongation of 28%

[0037] Dyed woven or knitted fabric was prepared in the same way as Example 1, except that general polyester yarn (FDY 110D/36F TBR) having an elasticity modulus of 900 kg/mm^2 and an elongation of 28% was used.

Comparative Example 2. High-temperature dyeing method using general polyester yarn having an elasticity modulus of 900 kg/mm^2 and an elongation of 28%

[0038] General polyester yarn (FDY 110D/36F TBR) having an elasticity modulus of 1000 kg/mm^2 and an elongation of 28% and metallic yarn (1/100", polyester metallic yarn, MX Type, Seoheung Industry) were put together and twisted at 400 TPM to make a thread. By using the thread, a knitted work of single fabric was made by means of a circular knitting machine.

[0039] The composition of the dye, the amount of additives, and the composition of the dye bath were identical to those of Example 1. However, after the prepared woven or knitted fabric was put into the dye bath, the temperature was raised starting from 40°C for 40 minutes at a rate of 2 °C/min, and the final temperature was maintained at 120°C for 40 minutes. The dyed fabric was washed and then dried.

Comparative Example 3. High-temperature dyeing method using normal-pressure dyeing polyester yarn having an elasticity modulus of 500 kg/mm^2 and an elongation of 36%

[0040] This is substantially identical to Comparative Example 2, except that normal-pressure dyeing polyester yarn (FDY 110D/36F CBR, Ji-Young Trading) having an elasticity modulus of 500 kg/mm^2 and an elongation of 36% was used.

Test 1. Measurement of Properties

[0041] Washing fastness, rubbing fastness and light reflection reduction rate of the dyed knitted fabric according to the present disclosure were evaluated as shown in Table 1 below.

[0042] The washing fastness and the rubbing fastness were evaluated based on the gray scale, which are marked as Grades 1 to 5. Here, Grade 1 represents a poorest grade (bad), and Grade 5 represents a best grade (good).

[0043] For the appearance observation, after the knitted fabrics according to each example and comparative example were dyed, contamination of the metallic yarn by the dye and separation of the film layer were evaluated.

[0044] The light reflection reduction rate was calculated by measuring reflectivity before and after dyeing the metallic yarn with a spectrophotometer CM-3600d (Konica Minolta).

Table 1

	Washing fastness	Rubbing fastness	Light reflection reduction rate (%)	Appearance observation
Example 1	4	4	25	Excellent metallic clarity
Example 2	5	5	28	Excellent metallic clarity
Comparative Example 1	2	2	43	Metallic layer contamination
Comparative Example 2	4	4	49	Metallic layer separation
Comparative Example 3	3	4	43	Metallic layer separation

[0045] In comparison to the knitted fabric prepared using general polyester material, the knitted fabric prepared using the normal-pressure dyeing polyester having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40% has excellent washing fastness and excellent rubbing fastness, causes substantially no dye adsorption to the metallic yarn during the dyeing process, and maintains inherent gloss characteristics due to the low light reflection reduction rate. When general polyester is used, since the dyeing property of polyester is inferior at low-temperature dyeing, the washing fastness and the rubbing fastness were bad. At the high-temperature dyeing, the inherent gloss characteristic of the metallic layer deteriorates due to separation of the metallic film layer or contamination by the dye.

Test 2. Surface observation

[0046] The woven fabrics prepared according to Example 1 and Comparative Example 1 were photographed as shown in Figs. 1 and 2. Fig. 2 shows the fabric according to Example 1, and it may be found that the metallic yarn has more excellent photo-reflectivity in comparison to the fabric of Fig. 1 according to Comparative Example 1.

Claims

1. A method for manufacturing dyed woven or knitted fabric, comprising:

preparing woven or knitted fabric using metallic yarn and normal-pressure dyeing polyester yarn having an elasticity modulus of 400 to 600 kg/mm^2 and an elongation of 30 to 40%;
fabricating a dye bath by putting a dye solution obtained by dispersing a dye in water;
dyeing the woven or knitted fabric by putting the prepared woven or knitted fabric into the fabricated dye bath, raising a temperature of the dye bath starting from 35 to 45°C for 30 to 50 minutes at a rate of 1.2 to 1.5 °C/min, and maintaining the heated dye bath at 90 to 100°C for 15 to 25 minutes; and
washing the dyed woven or knitted fabric.

2. The method for manufacturing dyed woven or knitted fabric according to claim 1, before dyeing the woven or knitted fabric, further comprising:

preprocessing the prepared woven or knitted fabric at 75 to 85°C for 15 to 25 minutes by using a de-oiling agent before the prepared woven or knitted fabric is put into the dye bath.

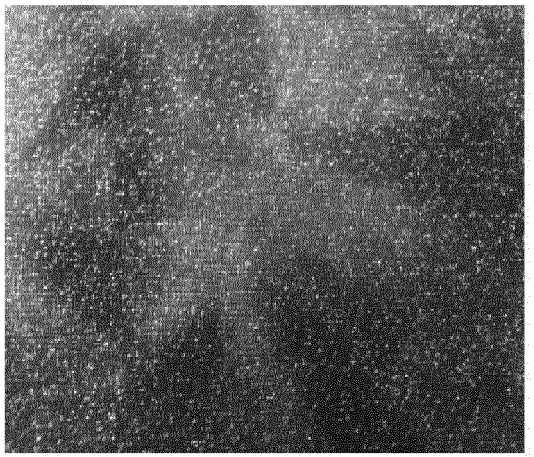
3. The method for manufacturing dyed woven or knitted fabric according to claim 1, wherein the dye solution includes at least one of glacial acetic acid, a dispersing agent, a softening agent, a stain repellant, and their mixtures.

4. Dyed woven or knitted fabric, which is manufactured by the method defined in any one of claims 1 to 3 and has a

light reflection reduction rate of 20% to 30%.

FIG. 1

FIG. 2



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2012/004270

A. CLASSIFICATION OF SUBJECT MATTER

D06P 3/34(2006.01)i, D06P 3/82(2006.01)i, D06P 3/52(2006.01)i, D06P 3/80(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06P 3/34; D04B 21/14; D02G 3/12; D04B 1/14; D01F 6/62; D06M 11/83; D06B 3/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: metallic yarn, metal covered yarn, dyeing, atmospheric dyeing polyester

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2006-257633 A (FUASUTAA:KK) 28 September 2006 See abstract, the claims	1-4
A	KR 10-0588215 B1 (HYOSUNG CORPORATION) 08 June 2006 See abstract, the claims	1-4
A	JP 2007-191811 A (SEIREN CO LTD) 02 August 2007 See abstract, the claims	1-4
A	KR 10-0955517 B1 (IM, DONG HYUN) 30 April 2010 See abstract, the claims	1-4

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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"P" document published prior to the international filing date but later than the priority date claimed
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 DECEMBER 2012 (27.12.2012)	**28 DECEMBER 2012 (28.12.2012)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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Patent document cited in search report	Publication date	Patent family member	Publication date
JP 2006-257633 A	28.09.2006	EP 1008682 A1	14.06.2000
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KR 10-0955517 B1	30.04.2010	NONE	

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 10955517 **[0005]**
- KR 10656184 **[0005]**