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(72) Inventors:

- **PARK, Jong-ho**
Seoul 07793 (KR)
- **PIAO, Zhequan**
Seoul 07793 (KR)
- **JUNG, Dae-young**
Seoul 07793 (KR)

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(74) Representative: **Ter Meer Steinmeister & Partner**
Patentanwälte mbB
Nymphenburger Straße 4
80335 München (DE)

(71) Applicant: **Kolon Industries, Inc.**
Seoul 07793 (KR)

(54) **NON-WOVEN ARTIFICIAL LEATHER USING DOPE-DYED POLYESTER SEA-ISLAND TYPE COMPOSITE YARN AND METHOD FOR PRODUCING SAME**

(57) The present disclosure relates to a method for manufacturing artificial leather having excellent fastness and dyeing properties by using a dope-dyed polyester sea-island type composite yarn, and artificial leather produced by the same method.

According to the present disclosure, a non-woven fabric, which is made of a dope-dyed polyester sea-island type composite yarn to which an organic or inorganic pigment, or both an organic pigment and an inorganic pigment, are added, is produced by: impregnating the same with a polyurethane resin to which an organic or

inorganic pigment, or both an organic pigment and an inorganic pigment, are added; performing weight reduction processing; and then dyeing the same with a disperse dye, whereby various colors can be expressed, the artificial leather is uniformly dyed with the pigment, the amount of dye used can be reduced by excellent dyeability and deep color expression, and excellent fastness and high-grade quality are expressed, thereby making it possible to develop products for advanced applications such as interior materials for a vehicle.

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Description**[Technical Field]**

5 **[0001]** The present disclosure relates to a method for manufacturing artificial leather having excellent fastness and dyeing properties by using a dope-dyed polyester sea-island type composite yarn, and artificial leather manufactured by the same method.

[Background Art]

10 **[0002]** Artificial leather includes a non-woven fabric with a three-dimensional structure as a primary backing, and has a microporous structure as a whole due to a three-dimensional structure of ultrafine yarn and polyurethane resin. Thus, the artificial leather has a touch feeling of a leather skin layer which is similar to natural leather, and thus is widely used in various fields such as shoes, clothes, gloves, miscellaneous goods, furniture, automobile interior materials, etc.

15 **[0003]** Conventional ultrafine fiber nonwoven artificial leather has difficulty in uniform dyeing and deep shade development of ultrafine yarns, and due to the non-dyeability of the polyurethane resin, a dyeing difference occurs between the ultrafine yarn and the polyurethane resin, and two-tone or uneven dyeing occur. As an excessive amount of dye is introduced for the development of deep shade, the dyeing cost increases and the fastness decreases, so that it is difficult to achieve a luxuriously high quality.

20 **[0004]** In order to solve these problems, the development of artificial leather using a dope-dyed ultrafine yarn made of polyester or polyamide materials by containing carbon black as a dope-dyed component has been advanced. For example, Korean Patent No. 10-0148515 discloses a method of manufacturing artificial leather having excellent fastness properties and touch feeling.

25 **[0005]** The artificial leather is produced by impregnating a nonwoven fabric made of dope-dyed polyamide ultrafine yarn with a polyurethane resin and dyeing the fabric with a vat dye. The above method can obtain the effect of improving the dyeing fastness by combination dyeing of the dope-dyed yarn and the piece dyeing method, but since this method uses a vat dye, light resistance is lowered as compared with a disperse dye and the weather resistance of the polyamide fibers is lowered, and thus there is a problem that it is difficult to apply to automotive interior materials.

30 **[0006]** As another example, Korean Patent No. 10-1218195 discloses a method for manufacturing artificial leather having a circular knitted structure by combining a high-shrinkage polyester with a black dope-dyed polyester-based ultrafine yarn.

35 **[0007]** Since the above method uses a black dope-dyed ultrafine yarn, it is possible to have excellent fastness and provide an effect of generating no dye migration, but artificial leather is limited to circular knitted fabric of dope-dyes polyester yarn. Consequently, since the quality characteristics are limited compared to the suede type of artificial leather made of non-woven fabric, there is a disadvantage that usage is limited to high value-added products for furniture, interior materials, high-quality miscellaneous goods, and the like.

40 **[0008]** As yet another example, Korean Patent No. 10-0375245 discloses a method of manufacturing a warp knitted fabric used for the production of artificial leather, wherein a surface structure is composed of a sea-island type composite fiber, a medium structure is composed of a spandex elastic yarn, and a backing structure is composed of a highly shrinkable yarn, and then these are subjected to warp knitting, napping, preliminary heat treatment, weight reduction, buffing, and final heat treatment to produce a warp knitted fabric.

45 **[0009]** Further, the warp knitted fabric is composed of a surface structure of a dope-dyed ultrafine yarn, a median structure of elastic yarn, and a highly shrinkable backing surface structure, and thus has advantages in terms of excellent fastness, touch feeling, air permeability, and moisture permeability. However, there is a disadvantage in that the mechanical strength required for leather is insufficient, and it can be applied only to gray or black achromatic series, so that it is impossible to develop a product with various colors.

50 **[0010]** The artificial leather using the dope-dyed ultrafine yarn in this way uses either a metal complex dye or a vat dye in the case of polyamide fibers. Consequently, there is a problem that the light resistance of the artificial leather is lowered compared to disperse dyes, and in the case of using the dope-dyed polyester yarn, the structure is warp-knitted fabric or circular-knitted fabric, which causes a problem that the product quality is inferior to that of nonwoven artificial leather.

[DETAILED DESCRIPTION OF THE PRESENT DISCLOSURE]**[Technical Problem]**

[0011] In order to solve the above-mentioned problems, an object of the present disclosure is to provide artificial leather capable of exhibiting a high-quality appearance and high fastness properties by improving the coloring and production

process using a dope-dyed polyester sea-island type composite yarn, and a method for manufacturing the same.

[Technical Solution]

[0012] In order to achieve the above object, in one aspect of the present disclosure, a method for manufacturing a nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn is provided, the method including the steps of: preparing a sea-island type composite yarn composed of an alkali-soluble resin as a sea component and an alkali-insoluble polyester resin containing a pigment as an island component; making the sea-island type composite yarn into staple fibers to prepare a nonwoven fabric; impregnating the nonwoven fabric with a polyurethane resin to which a pigment is added; removing the sea component by alkaline weight reduction processing of the nonwoven fabric impregnated with the polyurethane resin, thereby preparing an ultrafine nonwoven fabric of the island component; buffing the surface of the ultrafine fiber nonwoven fabric to form napping; and dyeing the napped nonwoven fabric with a disperse dye.

[0013] In another aspect of the present disclosure, nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn, which is composed of a dope-dyed polyester ultrafine yarn produced by weight reduction processing of the sea-island type composite yarn, and in which a disperse dye is dyed in a nonwoven fabric impregnated with a pigment-containing polyurethane resin, is provided.

[ADVANTAGEOUS EFFECTS]

[0014] According to the present disclosure, a non-woven fabric, which is made of a dope-dyed polyester sea-island type composite yarn to which an organic or inorganic pigment, or both an organic pigment and an inorganic pigment are added, is produced by: impregnating the same with a polyurethane resin to which an organic or inorganic pigment, or both an organic pigment and an inorganic pigment are added; performing weight reduction processing; and then dyeing the same with a disperse dye, whereby various colors can be expressed, the artificial leather is uniformly dyed with a dye, and the amount of dye used can be reduced by excellent dyeability and deep color expression.

[0015] In addition, high-grade quality is expressed while having excellent fastness, thereby making it possible to develop products for advanced applications such as interior materials for a vehicle.

[DETAILED DESCRIPTION OF THE EMBODIMENTS]

[0016] According to one embodiment of the present disclosure, an artificial leather having improved fastness properties is produced by preparing a dope-dyed polyester sea-island type composite yarn to which an organic or inorganic pigment, or both an organic pigment and an inorganic pigment are added, making the prepared sea-island type composite yarn into staple fibers to produce a non-woven fabric; impregnating the nonwoven fabric with a polyurethane resin to which a pigment is added; performing alkaline weight reduction processing to make ultrafine fibers, and then buffing the surface of the ultrafine fiber nonwoven fabric to form napping; and dyeing the napped nonwoven fabric with a disperse dye.

[0017] The step of preparing a sea-island type composite yarn includes a step composite-spinning a first polymer of a sea component dissolved and eluted in a solvent, and a second polymer of an island component remaining without being dissolved in solvent.

[0018] The first polymer of the sea component may be composed of a copolyester, polystyrene, polyethylene, or the like. Preferably, it may be composed of a copolyester having excellent alkaline solubility.

[0019] The second polymer of the island component may be composed of a polyester material which can be dyed with a disperse dye without being dissolved in an alkaline solvent, and specific examples thereof include polyethylene terephthalate, polyoxyethylene benzoate, polybutylene terephthalate, polytrimethylene terephthalate, polytriethylene terephthalate, and the like.

[0020] In the composite spinning, the first polymer of the sea component and the second polymer of the island component are respectively introduced into an extruder, melt-extruded, discharged, and spun through a composite spinning nozzle, wherein a masterbatch chip in which an organic pigment or an inorganic pigment, or both an organic pigment and an inorganic pigment are used is added to the second polymer of the island component through a side feeder, thereby manufacturing a sea-island type composite yarn containing the dope-dyed polyester island component.

[0021] The content of a pigment in the island component is preferably 0.1 to 5.0 % by weight. If the content is less than 0.1 % by weight, the color after exposure becomes very pale when performing light color dyeing and evaluating light fastness, it is difficult to improve the light resistance, and no reduction in the amount of dye used can be expected. If the content exceeds 5.0 % by weight, the color becomes too dark, it is not easy to dye with a specific color, and the color that can be dyed can be limited.

[0022] The step of producing the nonwoven fabric of the present disclosure includes making the sea-island type composite yarn into staple fibers, carding the staple fibers, forming a web via crosslapping, and needle punching the

formed web.

[0023] The step of impregnating the nonwoven fabric with a polyurethane resin can be carried out by a process in which the polyurethane resin is dissolved in an organic solvent such as dimethylformamide (DMF), an organic pigment or an inorganic pigment is added thereto, stirred, and homogenized, and after homogenization, the viscosity is adjusted with an organic solvent to obtain an impregnation solution, and the nonwoven fabric is immersed in the impregnation solution.

[0024] The pigment added to the impregnation solution is preferably contained in an amount of 0.1 to 6.0 % by weight in the polyurethane resin. If the pigment content is less than 0.1 % by weight, color unevenness occurs between the ultrafine yarns of the artificial leather and the polyurethane resin after dyeing. If the pigment content exceeds 6.0 % by weight, the color becomes very thick and it is difficult to express various colors in the artificial leather produced.

[0025] The amount of the impregnation solution impregnated into the nonwoven fabric is preferably set such that the polyurethane resin containing a pigment is contained in an amount of 15 to 40 % by weight based on the artificial leather as the final product. When the amount of the impregnation solution is less than 15 % by weight, the elasticity specific to the polyurethane resin is hardly exhibited, the ability of the polyurethane resin to grip the fibers constituting the nonwoven fabric is reduced, and fiber dropping occurs in artificial leather, resulting in poor appearance on the surface. If the amount of the impregnation solution exceeds 40 % by weight, the soft touch feeling in artificial leather is reduced, which is not preferable.

[0026] As described above, since the pigment is contained in the ultrafine yarn and the polyurethane resin, the artificial leather of the present disclosure has a uniform color between the ultrafine yarn and the polyurethane resin after dyeing, and exhibits excellent fastness properties as compared to a method for manufacturing a general artificial leather.

[0027] After immersing the nonwoven fabric in the polyurethane resin solution, the polyurethane resin impregnated into the nonwoven fabric is coagulated, and then washed in a washing tank. Subsequently, the sea component is removed from the sea-island type composite yarn of the nonwoven fabric, and the staple fibers are ultra-finely fibrillated to produce an ultrafine fiber nonwoven fabric.

[0028] The ultrafine fiber nonwoven fabric step is a step of ultra-finely fibrillating staple fibers by eluting the first polymer as a sea component using an alkaline solvent such as an aqueous sodium hydroxide solution so that only the second polymer as a sea component remains, wherein the bicomponent polymers having different solubility are divided into the sea-island type composite yarns by alkaline weight reduction processing to have a ultrafine fiber shape, and as one strand of fiber is divided into a plurality of ultrafine fibers, it can express a high-grade appearance and a soft touch feeling.

[0029] It is preferable that the single yarn fineness of the island component ultrafine yarn is 0.04 to 0.30 denier after eluting the sea component, and the number of island component fibers per filament is 7 to 36. When the single yarn fineness is less than 0.04 denier, the amount of dye used may increase, and the fastness properties may deteriorate. When the single yarn fineness exceeds 0.30 denier, the soft touch feeling specific to ultrafine yarn is hardly exhibited.

[0030] Next, a napping treatment of rubbing the surface of the ultrafine fiber nonwoven fabric by means such as sandpaper so that a large amount of hairiness is formed on the surface of the nonwoven fabric, and a dyeing step is performed after the napping treatment.

[0031] The dyes used in the dyeing step include disperse dyes, such as azo-based disperse dyes, heterocyclic azo-based dyes, anthraquinone-based disperse dyes, condensed disperse dyes, quinoline-based disperse dyes, Coumarin-based disperse dyes, amino ketone-based disperse dyes, and diester-type of disperse dyes.

[0032] The dyeing step may be performed for 30 to 60 minutes at a temperature of the dyeing liquid ranging from 115 to 130 °C for 30 to 60 minutes, and it is also possible to add an ultraviolet absorber, a dispersing agent, and an acid component to the dyeing liquid.

[0033] A reduction cleaning step for removing unfixed dyes and impurities on the surface of the dyed ultrafine fiber nonwoven fabric may be further performed. The reduction cleaning step may be performed at 40 to 100 °C for 10 to 30 minutes. The reduction cleaning liquid may be sodium hydroxide or sodium hydrosulfite, and through the reduction cleaning step, undyed dyes on the artificial leather are removed.

[0034] In addition, after the reduction cleaning step, a rinsing step using water may be further performed for removing the cleaning solution.

[0035] As described above, the method for manufacturing the artificial leather of the present disclosure solves problems such as dyeing unevenness of the artificial leather for fashion goods such as suede-type of furniture skin material, inner skin and outer skin of bags, deterioration of the fastness, and the like, and improves the drawback of excessively adding a dye for developing a deep color, thereby reducing costs and improving fastness properties.

[0036] Hereinafter, the present disclosure will be described in more detail by way the following examples, comparative examples, and test examples.

[0037] However, these examples are for illustrative purposes only, and the present disclosure is not limited thereto. It will be apparent to those of ordinary skill in the art that various substitutions and modifications can be made without departing from the scope and spirit of the invention.

<Example 1>

[0038] Polyethylene terephthalate was prepared as an island component, an alkali-soluble copolymer polyester was prepared as a sea component, and then the island component and the sea component were introduced into an extruder, followed by melt extrusion. When the island component was melt-extruded, a master batch containing 4 wt% of carbon black, 8 wt% of yellow organic pigment, and 8 wt% of red organic pigment was side-fed to the island component, and discharged through a spinning nozzle so that the content of a pigment in the island component was 1 wt%. Thereby, a dope-dyed polyester sea-island type composite yarn was prepared.

[0039] Subsequently, the composite yarn was crimped so that the crimp number became 10 to 13/inch, fixed by heating, and then cut into a size of 51 mm to prepare a sea-island type of staple fiber. The sea-island staple fibers were laminated into a web through a carding step and a crosslapping step, followed by needle punching to prepare a nonwoven fabric.

[0040] Polyurethane and carbon black were mixed in a dimethylformamide organic solvent to prepare an impregnation solution, and then the nonwoven fabric was immersed in the impregnation solution which was coagulated to prepare a polyurethane resin-impregnated nonwoven fabric in which 30 wt% of polyurethane resin (containing 0.1 wt% of carbon black in the polyurethane resin) was impregnated.

[0041] The polyurethane resin-impregnated nonwoven fabric was treated with a 5 wt% sodium hydroxide aqueous solution to elute a sea component. At this time, a polyester ultrafine fiber nonwoven fabric having a number of island components divided per filament of 16, single yarn fineness of 0.15 denier, and an L* value of 36.12, a a* value of 9.58, and a b* value of 13.16 when measured with a CIELAB color display system, was prepared.

[0042] The surface of the ultrafine fiber nonwoven fabric was ground with sandpaper having roughness of #240 to form napping (thickness of 1.0 mm), and then dyed under the following dyeing conditions.

(Dyeing condition)

[0043]

- Dye: red disperse dye (anthraquinone-based) 4.2 % (o.w.f.), black disperse dye (anthraquinone-based) 1.12 % (o.w.f.), yellow disperse dye (anthraquinone-based) 4.7 % (o.w.f.)
- UV-absorber: triazine derivative 4.0 % (o.w.f.)
- Dispersing agent: nonionic fatty acid ester 1 g/l
- Acid: acetic acid 1 g/l
- Bath ratio (additive weight:solvent weight): 1:20
- Dyeing temperature and time: 125 °C, 50 min

[0044] After completion of the dyeing, the dyeing residue was discharged from a dyeing machine and water was again added to the dyeing machine, and then 8 g/l of sodium hyposulfite and 4 g/l of sodium hydroxide were added, and the mixture was performed the reduction cleaning step at 80 °C under a bath ratio of 1:30 for 20 minutes. Thereafter, it was dried for 10 minutes at 130 °C to prepare artificial leather.

<Examples 2~4 and Comparative Examples 1~5>

[0045] Artificial leathers were prepared in the same manner as in Example 1, except that the content of pigment in the island component of the polyester sea-island type composite yarn and the content of carbon black in the polyurethane resin were as shown in Table 1 below, and the dye amount in the dyeing process in order to dye in a color similar to Example 1 was as shown in Table 1.

[Table 1]

Category	Content of pigment in island component (wt%)	Content of carbon black in polyurethane resin (wt%)	Dyeing process		
			Red disperse dye (% o.w.f.)	Black disperse dye (% o.w.f.)	Yellow disperse dye (% o.w.f.)
Example 1	1.0	0.1	0.42	1.12	4.70
Example 2	1.5	0.3	0.29	0.65	2.83

(continued)

Category	Content of pigment in island component (wt%)	Content of carbon black in polyurethane resin (wt%)	Dyeing process		
			Red disperse dye (% o.w.f.)	Black disperse dye (% o.w.f.)	Yellow disperse dye (% o.w.f.)
Example 3	2.0	0.5	0.19	0.32	1.58
Example 4	5.0	3.0	0.04	0.08	0.77
Comparative Example 1	0	0	0.90	1.52	5.80
Comparative Example 2	0	0.1	0.88	1.44	5.58
Comparative Example 3	2.0	0	0.20	0.35	1.64
Comparative Example 4	5.0	0	0.07	0.22	1.08
Comparative Example 5	0	3.0	0.26	0.56	2.65

<Test Example 1> Color Measurement

[0046] The color was measured using CCM for the artificial leather prepared in Examples 1 to 4 and Comparative Examples 1 to 5, and the results are shown in Table 2 below.

[Table 2]

	L	a*	b*	Color evenness
Example 1	36.12	9.58	13.16	Good
Example 2	36.51	9.36	12.80	Good
Example 3	36.05	9.67	12.70	Good
Example 4	36.20	9.35	12.71	Good
Comparative Example 1	35.42	9.83	13.25	Bad
Comparative Example 2	35.81	9.90	13.72	Good
Comparative Example 3	36.70	9.21	13.49	Bad
Comparative Example 4	36.63	9.10	13.13	Bad
Comparative Example 5	35.90	9.25	12.95	Bad

[0047] Referring to Table 2 above, in the case of Examples 1 to 4 and Comparative Example 2, the colors of the ultrafine yarn of the artificial leather and the polyurethane resin were uniformly expressed after the dyeing step, but when the pigment was not contained in the polyurethane resin as in Comparative Examples 1, 3, and 4 or when an excessive amount of the pigment was contained in the polyurethane resin without containing the pigment in the ultrafine yarn as in Comparative Example 5, there was a problem that the dyed color was uneven.

[0048] In addition, examples in which the pigment was contained in the ultrafine yarn of the nonwoven fabric and the polyurethane resin could reduce the amount of dye used for expressing the same chromaticity as compared with comparative examples in which the pigment was not contained.

<Text Example 2> Measurement of dyeing fastness

[0049] The light fastness and rubbing fastness of the artificial leathers prepared in the examples and comparative

examples were measured by the following method, and the evaluation results are shown in Table 3.

- Fastness to light: The artificial leather was irradiated with light at 338.6 KJ/m² according to the method specified in ISO 105-B06: 1998 Condition Five, and the grade of fastness to light was determined using the grayscale (ISO 105 A02).
- Fastness to rubbing: The fastness to rubbing was measured according to the ISO 105 × 12 method. In the evaluation of the fastness to dry rubbing, two specimens of a 50 mm width and a 130 mm length parallel to the longitudinal direction were fixed to the test stand of the rubbing tester, and rubbers of the test rollers were covered with white cotton cloth of a 50 mm length and a 50 mm length and fixed. After applying a load of 9 ± 0.2 N to the rubber, the surface of the specimen was reciprocated 10 times at a reciprocating speed of 10 times/min and a passing distance of 100 mm. The white cotton cloth was peeled off after reciprocating 10 times, and the contamination degree of the white cotton cloth was determined according to the grayscale. The fastness to wet rubbing was evaluated in the same manner as the fastness to dry rubbing, and water was picked up at 98 to 100 % by the white cotton cloth.

[Table 3]

	Fastness to light (grade)	Fastness to dry rubbing (grade)	Fastness to wet rubbing (grade)
Example 1	3~4	4~5	4
Example 2	3~4	4~5	4~5
Example 3	4	4~5	4~5
Example 4	4	4~5	4~5
Comparative Example 1	2~3	3~4	4
Comparative Example 2	2~3	3~4	4
Comparative Example 3	4	4~5	4~5
Comparative Example 4	4	4~5	4~5
Comparative Example 5	2~3	3~4	3~4

[0050] From the results of Table 3, it can be confirmed that in the case of the examples and Comparative Examples 3 and 4 in which the ultrafine yarns constituting the artificial leather contain pigments, the fastness to light, the fastness to dry rubbing, and the fastness to wet rubbing are excellent as compared with the other comparative examples.

[0051] In addition, it can be confirmed that in the case of Comparative Example 5 in which an excessive amount of the pigment is contained in the polyurethane resin without containing the pigment in the ultrafine yarn, the overall fastness is reduced.

[Industrial Applicability]

[0052] The artificial leather according to the present disclosure can express various colors by dyeing a pigment and a dye on ultrafine fiber dope-dyed yarn, and due to excellent dyeability and development of deep color, a luxuriously high-quality appearance and a soft touch feeling are expressed. Thus, it is possible to develop products for high-grade applications, for example, as artificial leather for a suede-type furniture skin material, artificial leather for fashion goods such as inner skin and outer skin of bags, and automobile interior materials.

Claims

1. A method for manufacturing nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn, the method including the steps of:

preparing a sea-island type composite yarn composed of an alkali-soluble resin as a sea component and an alkali-insoluble polyester resin containing a pigment as an island component;
making the sea-island type composite yarn into staple fibers to prepare a nonwoven fabric;
impregnating the nonwoven fabric with a polyurethane resin to which a pigment is added;
removing the sea component by alkaline weight reduction processing of the nonwoven fabric impregnated with

the polyurethane resin, thereby preparing an ultrafine nonwoven fabric of the island component;
buffing the surface of the ultrafine fiber nonwoven fabric to form napping; and
dyeing the napped nonwoven fabric with a disperse dye.

- 5 **2.** The method for manufacturing nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn according to claim 1,
wherein the dyeing step is performed for 30 to 60 minutes at a temperature of the dyeing liquid ranging from 115 to 130 °C.
- 10 **3.** The method for manufacturing a nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn according to claim 1,
wherein after the dyeing step, further including a reduction cleaning step of the dyed nonwoven fabric with a reduction cleaning liquid at 40 to 100 °C for 10 to 30 minutes.
- 15 **4.** An nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn, which is composed of a dope-dyed polyester ultrafine yarn produced by weight reduction processing of the sea-island type composite yarn, and in which a disperse dye is dyed in a nonwoven fabric impregnated with a pigment-containing polyurethane resin.
- 20 **5.** The nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn according to claim 4,
wherein a content of a pigment in the dope-dyed polyester ultrafine yarn is 0.1 to 5.0 % by weight.
- 6.** The nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn according to claim 4,
wherein a content of a pigment in the polyester resin is 0.1 to 6.0 % by weight.
- 25 **7.** The nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn according to claim 4,
wherein the pigment-containing polyurethane resin is contained in an amount of 15 to 40 % by weight in the artificial leather.
- 30 **8.** The nonwoven artificial leather using a dope-dyed polyester sea-island type composite yarn according to claim 4,
wherein the ultrafine yarn of the ultrafine fiber nonwoven fabric has single yarn fineness of 0.04 to 0.30 denier.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2018/010040

A. CLASSIFICATION OF SUBJECT MATTER

D06N 3/00(2006.01)i, D06N 3/14(2006.01)i, D06P 1/16(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)

D06N 3/00; D01F 6/62; D06M 11/77; D06N 3/14; D06P 5/17; D06P 1/16

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)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2016-0082578 A (KOLON INDUSTRIES, INC.) 08 July 2016 See paragraphs [0009], [0021]-[0028]; and claims 1, 5.	1-8
Y	KR 10-0588596 B1 (KOREA MICRO FIBER CO., LTD.) 14 June 2006 See paragraphs [0006], [0025]-[0030]; and claim 1.	1-8
Y	KR 10-2015-0035139 A (KOLON INDUSTRIES, INC.) 06 April 2015 See paragraph [0053].	3
Y	JP 2002-327377 A (TORAY IND INC.) 15 November 2002 See paragraph [0033]; and claims 2, 3.	6
A	KR 10-2004-0029264 A (KURARAY CO., LTD.) 06 April 2004 See claims 1, 13, 15.	1-8

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

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Date of the actual completion of the international search

09 JANUARY 2019 (09.01.2019)

Date of mailing of the international search report

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