(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 623 655 A2**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
07.08.2013 Bulletin 2013/32

(21) Application number: **11829542.7**

(22) Date of filing: **27.09.2011**

(51) Int Cl.:
D04H 1/42 *(2012.01)* ***D06N 3/00*** *(2006.01)*

(86) International application number:
PCT/KR2011/007091

(87) International publication number:
WO 2012/044036 (05.04.2012 Gazette 2012/14)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **29.09.2010 KR 20100094743**

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(54) ARTIFICIAL LEATHER AND METHOD FOR MANUFACTURING SAME

(57) Disclosed are an artificial leather that comprises two or more types of short fibers made of different components and thus exhibits superior texture, flexibility, breathability and fullness and enables great weight reduction, and a method for manufacturing the same.

The artificial leather includes a non-woven fabric having a fineness of 0.001 to 0.5 denier, and a polymeric elastomer impregnated in the non-woven fabric, wherein the short fibers are two or more types of polyester short fibers having different numbers of repeat units of $-CH_2-$.

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Description

[Technical Field]

[0001] The present invention relates to an artificial leather and a method for manufacturing the same. More specifically, the present invention relates to an artificial leather useful as an alternative to natural leather and a method for manufacturing the same.

[Background Art]

[0002] An artificial leather is manufactured by impregnating a polymeric elastomer in a non-woven fabric comprising three-dimensionally entangled ultrafine fibers, which is widely utilized in a variety of applications such as shoes, clothes, gloves, miscellaneous goods, furniture and automobile interior materials due to natural leather-like soft texture and unique appearance.

[0003] Such an artificial leather is manufactured using a variety of fibers such as polyethylene terephthalate fibers and polyamide fibers.

[0004] However, a common artificial leather is made of short fibers containing a single component. Accordingly, the short fibers constituting the artificial leather exhibit similar mechanical physical properties and similar entanglement behaviors. As a result, distance and pores between short fibers are similar. Also, there is a problem of difficulty of realization of an artificial leather having satisfactory texture, fullness and flexibility due to differentiation in terms of interaction between short fibers.

[0005] Meanwhile, in order to impart fullness comparable to natural leather to an artificial leather, a method for increasing a density of a non-woven fabric through a shrinkage process is suggested. In addition, a method for improving flexibility of the artificial leather such as softener or tumbling treatment is suggested.

[0006] However, these methods may deteriorate other properties of an artificial leather such as texture or appearance.

[Disclosure]

[Technical Problem]

[0007] Therefore, the present invention is directed to an artificial leather and a method for manufacturing the same capable of preventing problems caused by these limitations and drawbacks of the related art.

[0008] The present invention is conceived in response to demand for a more fundamental method for improving physical properties of artificial leather, such as control of an internal structure of non-woven fabric.

[0009] It is one aspect to provide an artificial leather that comprises two or more types of short fibers made of different components, thus exhibiting superior texture, flexibility, breathability and fullness, and enabling considerable weight reduction.

[0010] It is another aspect to provide a method for manufacturing an artificial leather that comprises two or more types of short fibers made of different components, thus exhibiting superior texture, flexibility, breathability and fullness, and enabling great weight reduction.

[Technical Solution]

[0011] In accordance with one aspect of the present invention, provided is an artificial leather including: a non-woven fabric containing short fibers having a fineness of 0.001 to 0.5 denier; and a polymeric elastomer impregnated in the non-woven fabric, wherein the short fibers are two or more types of polyester short fibers having different numbers of repeat units of $-CH_2-$.

[0012] In accordance with another aspect of the present invention, provided is a method for manufacturing an artificial leather including: preparing two or more types of island-in-sea conjugate fibers, each comprising a sea component and an island component, wherein island components of the two or more types of island-in-sea conjugate fibers are two or more types of polyester polymers having different numbers of repeat units of $-CH_2-$; forming a non-woven fabric using the two or more types of island-in-sea conjugate fibers; and eluting the sea components from the two or more types of island-in-sea conjugate fibers to form an ultrafine non-woven fabric.

[0013] The general description described above and the following detailed description are provided only for exemplification and illustration of the present invention and should be construed as providing more detailed description of claims.

[Advantageous Effects]

[0014] The present invention has the following effects.

[0015] The artificial leather according to the present invention comprises two or more types of polyester short fibers having different elastic recovery. Short fibers having relatively high elastic recovery form a spring-like structure during an entanglement process for forming a non-woven fabric.

[0016] The artificial leather of the present invention has pores exhibiting superior compressive elasticity (in a thickness direction) and being uniformly formed to have a predetermined size, as compared to an artificial leather only comprising polyethylene terephthalate (two repeat units of $-CH_2-$) short fibers, since it partially comprises the spring-like structure. Accordingly, the present invention provides an artificial leather that has superior texture, flexibility, breathability and fullness and enables considerable reduction in weight.

[0017] Furthermore, this spring structure makes surface naps upright, enabling production of an artificial leather in which the difference in friction coefficient according to nap direction is minimized, as compared to a common artificial leather in which naps lie in one direction. Accordingly, the artificial leather of the present invention can reduce displeasure caused by the difference in friction property according to the nap direction.

[0018] Meanwhile, when a non-woven fabric was formed using only polyester short fibers having three or more repeat units ($-CH_2-$), an interior spring-like structure is readily formed, but entanglement between short fibers is difficult, a density and mechanical strength of the non-woven fabric are deteriorated, and an artificial leather satisfying appearance, texture and physical properties required for artificial leather manufacture companies cannot be produced.

[0019] In addition, the non-woven fabric according to the present invention comprises polyester short fibers, thus exhibiting superior adhesiveness to the polymeric elastomer, for example, polyurethane. Accordingly, the artificial leather of the present invention has superior durability.

[0020] The artificial leather having superior physical properties may be widely utilized in a variety of fields such as shoes, clothes, gloves, miscellaneous goods, furniture and vehicle internal materials.

[Best Mode]

[0021] Those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims. Accordingly, the present invention includes all alterations and modifications that fall within the scope of inventions described in claims and equivalents thereto.

[0022] Hereinafter, embodiments of the artificial leather and the method for manufacturing the same according to the present invention will be described in detail.

[0023] The artificial leather of the present invention comprises a non-woven fabric and a polymeric elastomer impregnated in the non-woven fabric.

[0024] The non-woven fabric comprises short fibers having a fineness of 0.001 to 0.5 denier. The non-woven fabric having a fineness satisfying a range defined above has superior texture. When the fineness of the short fibers is lower than 0.001 denier, the texture of the non-woven fabric is good, but it is not easy to manufacture the non-woven fabric and color fastness to washing, indicating a loss level of a dye after washing, may be deteriorated. Meanwhile, when the fineness of the short fibers exceeds 0.5 denier, the texture of the non-woven fabric may not be good.

[0025] The fineness of short fibers may be calculated by collecting a sample using gold coating, photographing a cross-section of the sample at a predetermined magnification with a scanning electron microscope (SEM), measuring a diameter of the short fibers and applying the diameter of the short fibers to the following Equation:

$$\text{Fineness (denier)} = 9\pi D2\rho/4000$$

wherein π is a circular constant, D is a cross-sectional diameter of short fibers (μm) and p is a fiber density (g/cm^3).

[0026] The non-woven fabric of the present invention comprises two or more types of polyester short fibers. The two or more types of polyester short fibers have at least one repeat unit of $-CH_2-$. Different types of polyester short fibers have different numbers of repeat units of $-CH_2-$.

[0027] Selectively, the two or more types of polyester short fibers may have two or four repeat units. For example, the non-woven fabric may comprise two or more types of short fibers including polyethylene terephthalate (PET) short fibers, polytrimethylene terephthalate (PTT) short fibers, and polybutylene terephthalate (PBT) short fibers.

[0028] The polyethylene terephthalate short fibers are relatively cheap and exhibit superior tensile strength. In addition, the polyethylene terephthalate short fibers have a high melting point and thus exhibit superior heat resistance. Accordingly, the non-woven fabric of the present invention may requisitely comprise polyethylene terephthalate short fibers which are one of the two or more types of polyester short fibers.

[0029] A content of the polyethylene terephthalate short fibers in the non-woven fabric is 5 to 95% by weight, preferably 10 to 50% by weight. When the content of the polyethylene terephthalate short fibers is lower than 5% by weight, mechanical strength of the non-woven fabric may be deteriorated, and when the content of the polyethylene terephthalate short fibers is higher than 95% by weight, short fibers constituting the non-woven fabric cannot form a dense structure and, as a result, an artificial leather made of the non-woven fabric may exhibit deterioration in texture, flexibility and fullness.

[0030] One of parameters, affecting texture, flexibility and fullness of an artificial leather, is mixing uniformity of short fibers of the non-woven fabric used for manufacture of the artificial leather. According to the present invention, the two or more types of polyester short fibers are uniformly mixed to an extent that the non-woven fabric has an weight variation coefficient (CV%) of 20% or less. When the weight variation coefficient of the non-woven fabric exceeds 20%, texture, flexibility and fullness of the artificial leather made of the non-woven fabric may be deteriorated.

[0031] The weight variation coefficient (CV%) is calculated by collecting samples at various positions of the non-woven fabric, measuring a weight per unit area of the samples, calculating a standard deviation and an arithmetic mean using the measured weight per unit area and obtaining the weight variation coefficient in accordance with the following Equation:

$$\text{weight variation coefficient (CV\%)} = \text{Standard deviation/arithmetic mean.}$$

[0032] The different types of polyester short fibers constituting the non-woven fabric of the present invention may have different "elastic recovery at an elongation of 20%".

[0033] In one embodiment of the present invention, maximum and minimum values of "elastic recovery at an elongation of 20%" of different types of short fibers constituting the non-woven fabric of the present invention are present and a ratio of the maximum value to the minimum value is 10 to 80%.

[0034] When the ratio of the maximum value to the minimum value regarding the elastic recovery at an elongation of 20% is within the range defined above, two or more types of short fibers constituting the non-woven fabric may be densely entangled and short fibers having a relatively high elastic recovery may form a spring-like structure. Accordingly, the artificial leather made of a non-woven fabric exhibits superior texture, flexibility and fullness.

[0035] When the ratio of the maximum value to the minimum value regarding the elastic recovery at an elongation of 20% is lower than 10%, two or more types of short fibers constituting the non-woven fabric may be densely entangled, and short fibers having a relatively high elastic recovery may not form a spring-like structure. As a result, texture, flexibility and fullness of the artificial leather may be deteriorated. On the other hand, when the ratio of the maximum value to the minimum value regarding the elastic recovery at an elongation of 20% is higher than 80%, it may not be easy to manufacture a non-woven fabric.

[0036] Owing to the short fibers having a relatively high elastic recovery that form a spring structure, compressive elasticity in a thickness direction of the artificial leather is improved. The compressive elasticity may be represented by compressibility and recovery rate. That is, the artificial leather made of the non-woven fabric according to the present invention has a compressibility (thickness direction) of 8 to 50%. When the compressibility of the artificial leather is lower than 8%, the artificial leather is hard and rigid, and when the compressibility thereof is higher than 50%, texture such as fullness is deteriorated.

[0037] Meanwhile, the recovery rate indicates a level of recovery, when a load is removed after compression. The artificial leather made of the non-woven fabric according to the present invention has a recovery rate of 80% or more. When the recovery rate of the artificial leather is lower than 80%, the artificial leather is deteriorated in shape stability and fullness and cannot exhibit luxury and exclusivity.

[0038] In addition, fibers having a high elastic recovery exhibit superior recovery to an applied exterior power. When the artificial leather comprises fibers having a high elastic recovery, surface nap formed through a grinding process such as a buffing process becomes more upright due to the internal spring structure. Accordingly, a difference in friction coefficient between forward direction (nap direction) and reverse direction on the surface of the artificial leather is considerably reduced, a difference in texture between directions on the surface of the artificial leather is reduced, the difference according to direction is minimized and surface texture can thus be improved. When the difference in friction coefficient between forward and reverse directions is decreased, texture of the artificial leather is superior. In one embodiment of the present invention, the difference in the friction coefficient is 0.30 or less.

[0039] The two or more types of polyester short fibers constituting the non-woven fabric have a length of 5 to 100 mm. When the short fibers satisfying the length range are entangled, manufacture processibility of the non-woven fabric can be improved and the artificial leather made of the non-woven fabric exhibit superior physical properties. When the length of the short fibers is lower than 5 mm, it may be difficult to manufacture the non-woven fabric, and strength and texture of the artificial leather may be deteriorated. Meanwhile, when the length of the short fibers exceeds 10 mm, it may be

difficult to manufacture the non-woven fabric.

[0040] The polymeric elastomer impregnated in the non-woven fabric may be polyurethane. Specifically, the polymeric elastomer may be polycarbonatediol, polyesterdiol, polyetherdiol or a mixture thereof. Selectively, the polymeric elastomer is polysiloxane. The polymeric elastomer is not limited to polyurethane or polysiloxane.

[0041] A content of the polymeric elastomer in the artificial leather may be 20 to 30% by weight. When the content of the polymeric elastomer is lower than 20% by weight, the desired elongation cannot be obtained, and when the content of the polymeric elastomer exceeds 30% by weight, the texture of the artificial leather is deteriorated, the artificial leather is readily discolored and an elongation of the artificial leather is also deteriorated.

[0042] The artificial leather of the present invention has an "elastic recovery at an elongation of 10%" of 80% or more. The artificial leather having an elastic recovery of 80% or more can be easily recovered to the original shape although a pressure is applied thereto for a long period of time. Owing to the superior elastic recovery, when the artificial leather of the present invention is applied to products such as shoes, clothes, gloves, miscellaneous goods, furniture and vehicle internal materials, the products are not wrinkled and a natural and luxurious appearance can be realized.

[0043] Next, a method for manufacturing an artificial leather in accordance with one embodiment of the present invention will be described in detail.

[0044] First, two or more types of island-in-sea conjugate fibers comprising a sea component and an island component are prepared. Specifically, a molten solution of a sea component polymer and a molten solution of an island component polymer solution are prepared and a conjugate spinning process is performed using a conjugate spinneret to prepare filaments. Subsequently, the filaments are extended. Crimps are formed on the extended filaments and the crimped filaments are cut to a predetermined length to obtain island-in-sea conjugate fibers having a monofiber shape.

[0045] According to the present invention, island components of the two or more types of island-in-sea conjugate fibers have repeat units of $-CH_2-$ and are polyester polymers which have different numbers of the repeat units.

[0046] That is, the first island-in-sea conjugate fibers may comprise the first and second polymers as sea and island components and the second island-in-sea conjugate fibers may comprise first and third polymers as sea and island components. The third island-in-sea conjugate fibers comprising the first and fourth polymers may be further provided as the sea and island components. That is, the first to third island-in-sea conjugate fibers comprise the same polymers as sea components and different polymers as island components. For the subsequent sea component elution process, the first polymer is different from the second to fourth polymers in terms of solubility in solvent.

[0047] For example, the second polymer may be polyethylene terephthalate (PET), the third polymer may be polybutylene terephthalate (PBT), and the fourth polymer may be polytrimethylene terephthalate (PTT).

[0048] Subsequently, a non-woven fabric is formed of the two or more types of island-in-sea conjugate fibers.

[0049] Specifically, the two or more types of island-in-sea conjugate fibers are subjected to opening, blending and carding processes and island-in-sea conjugate fibers having a monofiber shape are homogeneously blended to form webs. Subsequently, the obtained webs are laminated through a cross-lapping process and the laminated webs are combined while the island-in-sea conjugate fibers are entangled by needle punching to prepare a non-woven fabric.

[0050] Optionally, the process of forming webs by blending two or more types of island-in-sea conjugate fibers may be carried out by an air-laid method using an air jet, a wet-laid method in which mixing is performed in water or the like.

[0051] The process of entangling the two or more types of island-in-sea conjugate fibers may also be carried out by rapid fluid treatment, chemical bonding or hot air through.

[0052] The produced non-woven fabric may have a unit weight of 100 to 700 g/m^2. A final product manufactured using the non-woven fabric using the unit weight has an optimum density.

[0053] Subsequently, a polymeric elastomer is impregnated in the non-woven fabric.

[0054] For example, a polymeric elastomer solution is prepared and the non-woven fabric is dipped in the polymeric elastomer solution. The polymeric elastomer solution may be prepared by dissolving or dispersing polyurethane in a predetermined solvent. For example, the polymeric elastomer solution may be prepared by dissolving polyurethane in a dimethylformamide (DMF) solvent or dispersing polyurethane in a water solvent. The polymeric elastomer solution may also be prepared by directly using a silicone polymeric elastomer without dissolving or dispersing a polymeric elastomer in a solvent.

[0055] Optionally, a pigment, a light stabilizer, an antioxidant, a flame retardant, a fabric softener, a coloring agent or the like may be added to the polymeric elastomer solution.

[0056] Before the non-woven fabric is dipped in the polymeric elastomer solution, the non-woven fabric is padded with an aqueous polyvinyl alcohol solution to stabilize the shape thereof.

[0057] An amount of the polymeric elastomer impregnated in the non-woven fabric can be controlled by controlling concentration of the polymeric elastomer solution or the like. Taking into consideration the fact that the content of polymeric elastomer finally present in the artificial leather is 20 to 30%, a concentration of the polymeric elastomer solution is preferably within 5 to 20% by weight. Also, the non-woven fabric is preferably dipped in the polymeric elastomer solution for 0.5 to 15 minutes while the temperature of polymeric elastomer solution having a concentration of 5 to 20% by weight is maintained at 10 to 30°C.

[0058] After dipping the non-woven fabric in the polymeric elastomer solution, the polymeric elastomer impregnated in the non-woven fabric is coagulated in a coagulation bath and washed in a washing bath. In the case in which the polymeric elastomer solution is obtained by dissolving polyurethane in a dimethylformamide solvent, the polymeric elastomer is coagulated in the coagulation bath containing a mixture of water and a small amount of dimethylformamide to induce elution of dimethylformamide contained in the non-woven fabric into the coagulation bath. Polyvinyl alcohol padded in the non-woven fabric and remaining dimethylformamide are removed from the non-woven fabric in the washing bath.

[0059] Subsequently, the polymeric elastomer-impregnated non-woven fabric is hot-calendered. The hot-calendaring may be carried out by passing the polymeric elastomer-impregnated non-woven fabric through a hot roller to compress the fabric. A temperature of the hot roller is maintained within a range of 80 to 200°C. When the temperature of the hot roller is lower than 80°C, hot calendering effect cannot be sufficiently obtained and when the temperature of the hot roller is higher than 200°C, short fibers of the non-woven fabric surface may be damaged.

[0060] Through the hot calendering process, the polymeric elastomers are rearranged and short fibers of the non-woven fabric surface are homogeneously arranged. As a result, during the subsequent process described below, uniform naps are formed on the surface of the non-woven fabric.

[0061] Subsequently, the sea component is removed from the hot-calendered non-woven fabric. When the sea component is eluted from the two or more types of island-in-sea conjugate fibers constituting the non-woven fabric, only the island component remains and the ultrafine non-woven fabric comprising ultrafine short fibers is formed. The elution process of the sea component may be carried out using an alkali solvent such as aqueous sodium hydroxide solution.

[0062] In the case of the non-woven fabric made of the first to third island-in-sea conjugate fibers, the first polymer which is the sea component is eluted and only the second to fourth polymers remain as island components. As a result, an ultrafine non-woven fabric comprising ultrafine short fibers is formed.

[0063] Optionally, the impregnation of the polymeric elastomer described above may be carried out after the ultrafine process, rather than before the ultrafine process. That is, instead of impregnating the polymeric elastomer in the non-woven fabric before the ultrafine process, the polymeric elastomer may be impregnated in the ultrafine non-woven fabric formed through the ultrafine process.

[0064] Subsequently, the ultrafine non-woven fabric is subjected to a raising process. The raising process forms a great amount of naps on the surface of the non-woven fabric by rubbing the surface of the ultrafine non-woven fabric with a polishing means such as sandpaper.

[0065] Subsequently, the raised non-woven fabric is dyed and then subjected to post-treatment to complete production of the artificial leather.

[0066] The produced artificial leather has a compressibility of 8 to 50% and a recovery rate of 80% or more, and the difference between a friction coefficient in a forward direction (nap direction) and a friction coefficient in a reverse direction on the surface of the artificial leather is 0.30 or less.

[0067] Hereinafter, the present invention will be described in detail with reference to examples and comparative examples. These examples are provided only for better understanding and should not be construed as limiting the scope and spirit of the present invention.

Example 1

[0068] Polyethylene terephthalate as an island component and copolymer polyester as a sea component were conjugate-spun to form filaments and the formed filaments were extended, crimped and cut to form first conjugate fibers in the form of short fibers having a fineness of 3.5 denier and a length of 50 mm. A content of polyethylene terephthalate which was the island component of the first conjugate fibers was 70% by weight and a content of the copolymer polyester which was the sea component thereof was 30% by weight.

[0069] In addition, second conjugate fibers in the form of short fibers having a fineness of 4.0 denier and a length of 51 mm were prepared in the same manner as in the first conjugate fibers, except that polytrimethylene terephthalate was used as the island component. The content of polytrimethylene terephthalate which was the island component of the second conjugate fibers was 70% by weight, and the content of the copolymer polyester which was the sea component was 30% by weight.

[0070] Subsequently, after the first conjugate fibers and the second conjugate fibers are supplied at amounts of 90% by weight and 10% by weight, respectively, they are subjected to opening, blending and then carding/cross-lapping processes to form a web laminate and the webs of the laminate were combined through needle punching to produce a non-woven fabric.

[0071] Subsequently, the non-woven fabric was thermally-contracted at a high temperature to increase a density of the non-woven fabric. Subsequently, polyurethane was dissolved in dimethylformamide (DMF) as a solvent to prepare a polyurethane solution having a concentration of 15% by weight, the high-density non-woven fabric was dipped for 8 minutes and the polyurethane was coagulated in an aqueous dimethylformamide solution having a concentration of 25%

by weight. The non-woven fabric was washed with 70°C water several times to produce a polyurethane-impregnated non-woven fabric.

[0072] Subsequently, the polyurethane-impregnated non-woven fabric was treated with 10% by weight of a 100°C sodium hydroxide aqueous solution, and only the island component was left by eluting the copolymer polyester as the sea component from the non-woven fabric to produce an ultrafine non-woven fabric.

[0073] Subsequently, the surface of the ultrafine non-woven fabric was buffed using a Roughness No. 240 sandpaper, and dyed in a high-pressure rapid dying machine using a dispersion dye, fixed, washed, dried and treated with a softener and an anti-static agent to obtain an artificial leather.

Example 2

[0074] An artificial leather was manufactured in the same manner as in Example 1, except that the second conjugate fibers were prepared using polybutylene terephthalate as the island component, instead of polytrimethylene terephthalate.

Example 3

[0075] An artificial leather was manufactured in the same manner as in Example 1, except that a non-woven fabric was produced such that the contents of the first conjugate fibers and the second conjugate fibers were 70% by weight and 30% by weight, respectively.

Example 4

[0076] An artificial leather was manufactured in the same manner as in Example 1, except that a non-woven fabric was produced such that the contents of the first conjugate fibers and the second conjugate fibers were 50% by weight and 50% by weight, respectively.

Example 5

[0077] An artificial leather was manufactured in the same manner as in Example 1, except that a non-woven fabric was produced such that the contents of the first conjugate fibers and the second conjugate fibers were 30% by weight and 70% by weight, respectively.

Example 6

[0078] An artificial leather was manufactured in the same manner as in Example 1, except that a non-woven fabric was produced such that the contents of the first conjugate fibers and the second conjugate fibers were 10% by weight and 90% by weight, respectively.

Example 7

[0079] An artificial leather was manufactured in the same manner as in Example 1, except that, in addition to the first and second conjugate fibers, third conjugate fibers comprising 70% by weight of polybutylene terephthalate (island component) and 30% by weight of copolymer polyester (sea component) were further used and a non-woven fabric was produced such that contents of the first to third conjugate fibers were 90%, 5% and 5%.

Example 8

[0080] An artificial leather was manufactured in the same manner as in Example 1, except that a non-woven fabric was produced such that contents of the first to third conjugate fibers were 50%, 25% and 25%.

Example 9

[0081] An artificial leather was manufactured in the same manner as in Example 7, except that a non-woven fabric was produced such that contents of the first to third conjugate fibers were 10%, 60% and 30%.

Example 10

[0082] An artificial leather was manufactured in the same manner as in Example 7, except that a non-woven fabric

was produced such that contents of the first to third conjugate fibers were 10%, 30% and 60%.

Comparative Example 1

[0083] An artificial leather was manufactured in the same manner as in Example 1, except that a non-woven fabric was produced using only the first conjugate fibers without the second conjugate fibers.

Comparative Example 2

[0084] An artificial leather was manufactured in the same manner as in Example 1, except that a non-woven fabric was produced using only the second conjugate fibers without the first conjugate fibers.

[0085] Elastic recovery, texture, surface texture, friction property, and compressive elasticity (compressibility and recovery rate) of the artificial leathers manufactured in Examples and Comparative Examples were measured in accordance with the following methods and the results are shown in Table 3 below.

Elastic recovery (%)

[0086] A sample in which a distance of 200 mm was marked was mounted on a tensile tester in which a distance between clamps was 250 mm, elongated to an elongation of 10% at a speed of 50 mm/min and was stood for one minute. Subsequently, the load was removed at the same speed as the tensile strength, the sample was stood for three minutes, an actual distance (x) of the distance marked above was measured and elastic recovery was measured in accordance with the following equation.

$$\text{Elastic recovery (\%)} = [(200 - x)/200] \times 100$$

Texture

[0087] In order to measure a texture of the artificial leather, an evaluation group including five specialists was formed. Functional tests regarding three items including flexibility, fullness and bending property were performed and evaluation was carried out by grading on a scale of 0 to 5, with 5 being the best. The scores of the respective items were summed, the scores assigned by five specialists were further added and evaluation was carried out in accordance with the following Table 1.

[TABLE 1]

Total	Texture
0~15	×
16~30	Δ
31~45	○
46~60	◎
61~75	☆

Surface texture

[0088] In order to measure surface texture of the artificial leather, an evaluation group including five specialists was formed. Functional tests regarding three items including flexibility, fullness and bending property were performed and evaluation was carried out by grading on a scale of 0 to 5, with 5 being the best. The scores of the respective items were summed, the scores assigned by five specialists were further added and evaluation was carried out in accordance with the following Table 2:

[TABLE 2]

Total	Surface texture
0~5	×

(continued)

Total	Surface texture
6~10	Δ
11~15	○
16~20	◎
21~25	☆

Friction property

[0089] Friction property was evaluated from the difference between a friction coefficient in a forward direction (nap direction) and a friction coefficient in a reverse direction on the surface of the artificial leather and the measurement method is as follows.

[0090] The friction coefficient in the forward direction which is a direction such as nap direction and the friction coefficient in the reverse direction opposite to the nap direction were measured using a friction tester (produced by Toyoseiko Co., Ltd.). Identical test specimens, objects in need of testing, were used as upper and lower friction materials and the upper material was set such that the nap direction thereof was opposite to a movement direction of the friction tester. Meanwhile, the lower friction material was adhered during measurement of friction coefficient in the forward direction such that the friction tester movement direction was equivalent to the nap direction, and the lower friction material was adhered during measurement of friction coefficient in the reverse direction such that the friction tester movement direction was opposite to the nap direction.

[0091] Under conditions including a movement distance of about 20 cm and a balance weight of 200 g of the lower friction material, an object to which a friction force was applied, a load cell of 1 kg and a chart scale of X1, various friction coefficients were measured three times and an average of the obtained measures was calculated to obtain a final friction coefficient value.

[0092] The value of friction coefficient was determined by reading a maximum static frictional force.

[0093] Friction property was determined from an absolute value of the difference between forward friction coefficient and reverse friction coefficient obtained using the friction coefficient value.

$$\text{Friction property} = |\text{forward friction coefficient} - \text{reverse friction coefficient}|$$

Compressive elasticity

[0094] The compressive elasticity (in the thickness direction) of the artificial leather was determined from a compressibility and a recovery rate, and the compressibility and recovery rate of the artificial leather were measured using a VMS PV-Series apparatus produced by G&P Technology.

[0095] An initial load of 900 gf/cm^2 was applied to a spherical indenter and the load was maintained for 30 seconds. Subsequently, 30 seconds after the initial load was removed, a maximum thickness (T1) of the artificial leather was measured to a level of 1/1,000 mm. The initial load was applied for 30 seconds again and a minimum thickness (T2) was measured to a level of 1/1,000 mm. Subsequently, 30 seconds after the initial load was removed, the thickness (T3) of the artificial leather was measured to a level of 1/1,000 mm. In addition, a compressibility and a recovery rate were calculated using the following equation.

$$\text{Compressibility (\%)} = [(T1 - T2)/T1] \times 100$$

$$\text{Recovery rate (\%)} = [(T3 - T2)/(T1 - T2)] \times 100$$

[TABLE 3]

No. of Ex.	Elastic recovery	Texture	Surface texture	Friction property	Compressibility (%)	Recovery rate (%)
Ex. 1	90	☆	☆	0.10	13.5	95.0
Ex. 2	87	☆	◎	0.21	12.0	93.0
Ex. 3	92	☆	☆	0.10	15.3	95.3
Ex. 4	93	☆	☆	0.09	18.2	97.0
Ex. 5	93	☆	☆	0.15	15.5	96.5
Ex. 6	92	◎	◎	0.20	13.0	95.1
Ex. 7	89	☆	☆	0.15	13.0	94.7
Ex. 8	87	☆	◎	0.18	14.3	95.2
Ex. 9	88	☆	◎	0.22	16.1	95.0
Ex. 10	82	○	◎	0.25	10.2	92.2
Comp. Ex. 1	76	○	○	0.35	7.3	70
Comp. Ex. 2	78	×	Δ	0.33	8.0	78

[0096] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. An artificial leather comprising:

   a non-woven fabric comprising short fibers having a fineness of 0.001 to 0.5 denier; and
   a polymeric elastomer impregnated in the non-woven fabric,
   wherein the short fibers are two or more types of polyester short fibers having different numbers of repeat units of $-CH_2-$.

2. The artificial leather according to claim 1, wherein number of the repeat units of each of the two or more types of polyester short fibers is two to four.

3. The artificial leather according to claim 1, wherein the non-woven fabric comprises 5 to 95% by weight of polyethylene terephthalate short fibers.

4. The artificial leather according to claim 1, wherein the non-woven fabric has an weight variation coefficient of 20% or less.

5. The artificial leather according to claim 1, wherein the two or more types of polyester short fibers have different elastic recovery at an elongation of 20% and a ratio of a maximum elastic recovery to a minimum elastic recovery at an elongation of 20% of the two or more types of polyester short fibers is 10 to 80%.

6. The artificial leather according to claim 1, wherein the two or more types of polyester short fibers have a length of 5 to 100 mm.

7. The artificial leather according to claim 1, wherein an elastic recovery of the artificial leather at an elongation of 10% is 80% or more.

8. The artificial leather according to claim 1, wherein a difference between a friction coefficient in a forward direction parallel to a nap direction of the artificial leather and a friction coefficient in a reverse direction of the forward direction

is 0.30 or less.

9. The artificial leather according to claim 1, wherein the artificial leather has a compressibility of 8 to 50%.

10. The artificial leather according to claim 1, wherein the artificial leather has a recovery rate of 80% or more.

11. A method for manufacturing an artificial leather comprising:

preparing two or more types of island-in-sea conjugate fibers, each comprising a sea component and an island component, wherein island components of the two or more types of island-in-sea conjugate fibers are two or more types of polyester polymers having different numbers of repeat units of $-CH_2-$;
forming a non-woven fabric using the two or more types of island-in-sea conjugate fibers; and
eluting the sea components from the two or more types of island-in-sea conjugate fibers to form an ultrafine non-woven fabric.

12. The method according to claim 11, further comprising impregnating a polymeric elastomer in the non-woven fabric before the formation of the ultrafine non-woven fabric.

13. The method according to claim 11, further comprising impregnating a polymeric elastomer in the ultrafine non-woven fabric.

14. The method according to claim 11, wherein the formation of the non-woven fabric is carried out using one or more of air-laid, wet-laid and carded/cross-lapped methods, and
the formation of the non-woven fabric comprises homogeneously mixing the two or more types of island-in-sea conjugate fibers such that the non-woven fabric has an weight variation coefficient of 20% or less.

15. The method according to claim 11, wherein the non-woven fabric has a unit weight of 100 to 700 g/m^2.