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(71) Applicant: **Taiwan Chin Co., Ltd.**
Taichung City 429 (TW)

(72) Inventors:
- **HUANG, Po-Shih**
429 TAICHUNG CITY (TW)
- **HUANG, Chuan-Yu**
429 TAICHUNG CITY (TW)

(74) Representative: **Straus, Alexander**
2K Patent- und Rechtsanwälte - München
Keltenring 9
82041 Oberhaching (DE)

(54) COMPOSITE TWIST COLOR FIBER

(57) Provided is a composite twist color fiber formed by joining polypropylene terephthalate (PPT) and cationic-dyeable polymer side by side. The polypropylene terephthalate (PPT) and the cationic-dyeable polymer differ in contraction rate, such that the composite fiber thus formed is not only helical but also extensible and contractile. Fabric made of the composite fiber is highly capable of elongating and retracting; hence, not only do finished products made of the fabric have low contraction rate, but surface of the fabric also exhibits satisfactory mixing tones.

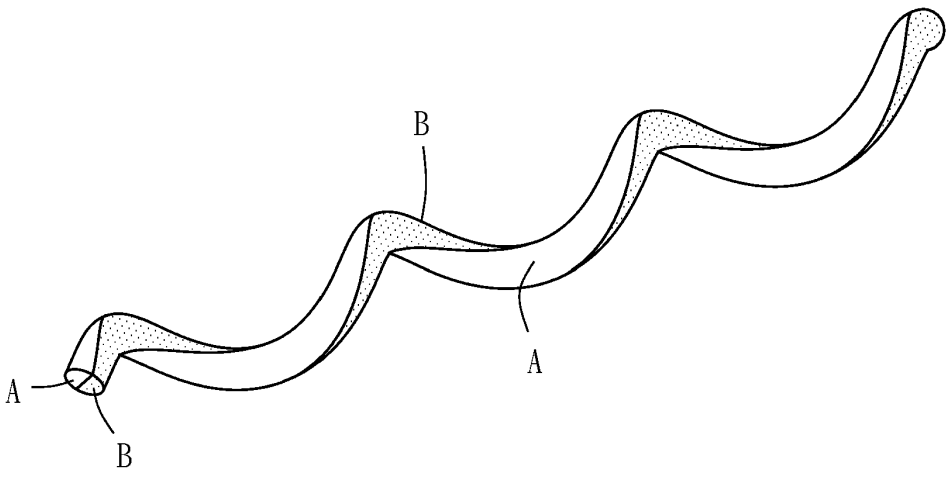

FIG. 2

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present disclosure relates to fibers and, more particularly, to a composite twist color fiber comprising two different polymers running side by side and capable of helical extensibility and contractility.

2. Description of the Related Art

[0002] In general, one way to enable a composite fiber to demonstrate elasticity in order for it to be extensible and contractile is: the fiber is intrinsically elastic, to the same extent as rubber bands are. Owing to physical properties imparted by its molecular structure, the fiber is intrinsically elastic and thus can be stretched. However, its drawback is: when the fiber is stretched, its diameter decreases, leading to two disadvantages. First, finished products made of the fiber have overly high contraction rate. Second, after long use, the fiber is susceptible to elastic fatigue and thus becomes less elastic or severs. The most typical elastic polyurethane fiber is Spandex, commonly known as Lycra, which was developed by DuPont and is currently commercially-available. Owing to its tendency to sever, Spandex does not exist alone but winds around other filament bundles by an intricate processing process (monolayer sheathed, bilayer sheathed or nylon covered spandex yarn) to bring two disadvantages. First, the processing process incurs high manufacturing cost. Second, the fiber thus manufactured is difficult to undergo subsequent dyeing and finishing, and thus Spandex is likely to sever during the processing process.

[0003] Another way to enable a composite fiber to demonstrate elasticity in order for it to be extensible and contractile is: mechanical elastic yarn is formed by joining a standard polyethylene terephthalate (PET) and a denatured polyethylene terephthalate (PET) side by side. During a fiber forming processing, a single composite fiber is flanked by a standard polyethylene terephthalate and a denatured polyethylene terephthalate. After undergoing heat treatment, the standard polyethylene terephthalate and the denatured polyethylene terephthalate differ in contraction rate, such that the fiber thus formed is helical; however, both of them are polyethylene terephthalate, and thus the difference in contraction rate between them is too small to bring desirable crimp elasticity, thereby failing to the need for usage of elastic fabric.

[0004] In view of this, prior art further disclosed improving the aforesaid structure by joining polyethylene terephthalate (PET) and polypropylene terephthalate (PPT) side by side to form a composite fiber, wherein, after being heated, the polypropylene terephthalate (PPT) and the polyethylene terephthalate (PET) differ greatly in contraction rate, such that fabric made of the fiber thus formed is not only dense, delicate and soft but also has satisfactory elastic elongation rate. However, when dyed, the composite fiber fabric made of the polypropylene terephthalate (PPT) and the polyethylene terephthalate (PET) attains one tone rather than two tones or mixing tones, leading to limited application, low popularity, and little value added. Therefore, the prior art still has room for improvement.

BRIEF SUMMARY OF THE INVENTION

[0005] In view of the aforesaid drawbacks of the prior art, it is an objective of the present disclosure to provide a composite twist color fiber. The composite fiber is formed by joining two polymers of different contraction rates side by side, steadily and uniformly, thereby rendering the fiber helical. Fabric made of the composite fiber is highly capable of elongating and retracting; hence, not only do finished products made of the fabric have low contraction rate, but surface of the fabric is also smooth, soft and delicate and exhibits mixing tones typical of a dual-color twist roll.

[0006] In order to achieve the above and other objectives, the present disclosure provides a composite fiber, comprising: a polymer A, being polypropylene terephthalate (PPT); and a polymer B, being cationic-dyeable polymer, wherein the polymer A and the polymer B run side by side to jointly form a composite fiber, and a transverse cross section of the fiber shows that the polymer A and the polymer B run side by side, wherein the polymer A and the polymer B differ in contraction rate. After undergoing heat treatment, the fiber takes on a helical 3D structure and thus is highly capable of elongating and retracting. Fabric made of the fiber feels good. Finished products made of the fabric have low contraction rate and is highly capable of elongating and retracting. Therefore, the present disclosure reduces manufacturing cost effectively, broadens the applications of the composite fiber and enhances its ease of use.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0007]

FIG. 1 is a schematic cross-sectional view of a composite fiber of present disclosure.

FIG. 2 is a schematic perspective view of the composite fiber of present disclosure.

FIG. 3 is a schematic cross-sectional view of the composite fiber according to another aspect of present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0008] Referring to FIG. 1 and FIG. 2, the present dis-

closure provides a composite twist color fiber. The composite fiber comprises a polymer A, i.e., polypropylene terephthalate (PPT), and a polymer B, i.e., cationic-dyeable polymer. The polymer A and the polymer B run side by side to jointly form one single fiber, such that the transverse cross section of the fiber shows that the polymer A and the polymer B run side by side. The polymer A and the polymer B differ in contraction rate. The aforesaid technique of joining two polymers side by side is also known as conjugate spinning, one of the conventional methods of manufacturing fiber yarns. The polymer A, i.e., polypropylene terephthalate (PPT), is a standard polyester fiber with a mechanical strength of 30.91-52.98 cN/tex. Regardless of whether it is dry or wet, the polymer A has the highest degree of stability of physical properties and manifests low deformability, high tolerance to heat, high thermoplasticity, high lightfastness and high weatherability. The polymer A has physical properties similar to those of wool and thus can be spun together with wool, rayon and cotton. The polymer B, i.e., cationic-dyeable polymer, is a low-priced modified polyester fiber whose polymeric structure has a cationic-dyeable sulfonate group and thus is deeply dyed and brightly colored. Furthermore, the polymer B demonstrates enhanced dyeability and enhanced tinting strength and thus can attain deep, bright colors with just a small amount of dye. In this embodiment, the polymer B, i.e., cationic-dyeable polymer, is cationic-dyeable polyethylene terephthalate (CD PET), cationic-dyeable polybutylene terephthalate (CD PBT) or cationic-dyeable polyamide (CD PA).

[0009] The polymer A and the polymer B can be firmly joined side by side, because of their excellent compatibility and resultant high adhesiveness, so as to prevent their separation during any subsequent composite fiber forming process. Referring to FIG. 3, the transverse cross section of the composite fiber shows that the polymer A and the polymer B run side by side and shows that the polymer B takes up 40-60% of total area of the fiber. Preferably, the polymer A and the polymer B each take up 50% of total transverse cross-sectional area of the fiber. Therefore, the present disclosure effectively enhances the overall bonding strength of the composite fiber and minimizes the chance that the composite fiber will sever. After undergoing heat treatment, the fiber takes on a helical 3D structure, because the polymer A and the polymer B differ in contraction rate. Therefore, finished products made of the composite fiber of the present disclosure have minimal contraction rate, because stretching the fiber causes elongation of the helical structure instead of a diminution in the diameter of the fiber.

[0010] The reason why the present disclosure discloses the use of the cationic-dyeable polyester is explained below. The polypropylene terephthalate (PPT) and the cationic-dyeable polymer differ in the tinting strength of cationic dye. Upon completion of a dyeing process performed with the same dye, the polypropylene terephthalate (PPT) and the cationic-dyeable polymer differ in tints and shades. Thus, the use of one single dye ensures that one single fiber will display two different colors which, coupled with the helical 3D structure of the fiber, enable every fiber to produce the same color pattern as exhibited by a dual-color twist roll, as shown in FIG. 2.

[0011] Fabric made of the composite fiber is highly capable of elongating and retracting. Therefore, finished products made of the fabric display different patterns and colors, have low contraction rate, incur low manufacturing cost, and have broad applications.

[0012] The present disclosure is disclosed above by preferred embodiments. However, persons skilled in the art should understand that the preferred embodiments are illustrative of the present disclosure only, but shall not be interpreted as restrictive of the scope of the present disclosure. Hence, all simple equivalent changes and modifications made to the aforesaid embodiments in accordance with the claims and specification shall fall within the scope of the present disclosure.

Claims

1. A composite fiber, comprising:

   a polymer (A), being polypropylene terephthalate (PPT); and
   a polymer (B), being cationic-dyeable polymer, wherein the polymer (A) and the polymer (B) run side by side to jointly form a fiber, and a transverse cross section of the fiber shows that the polymer (A) and the polymer (B) run side by side, wherein the polymer (A) and the polymer (B) differ in contraction rate.

2. The composite fiber of claim 1, wherein the polymer (B) is cationic-dyeable polyethylene terephthalate (CD PET), cationic-dyeable polybutylene terephthalate (CD PBT) or cationic-dyeable polyamide (CD PA).

3. The composite fiber of claim 2, wherein the polymer (B) takes up 40-60% of total area of the fiber.

4. The composite fiber of claim 3, wherein the polymer (A) and the polymer (B) each take up 50% of total transverse cross-sectional area of the fiber.

5. The composite fiber of claim 1, wherein, after undergoing heat treatment, the fiber takes on a helical 3D structure.

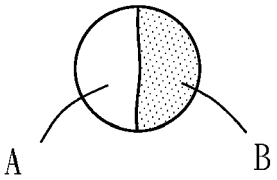

FIG. 1

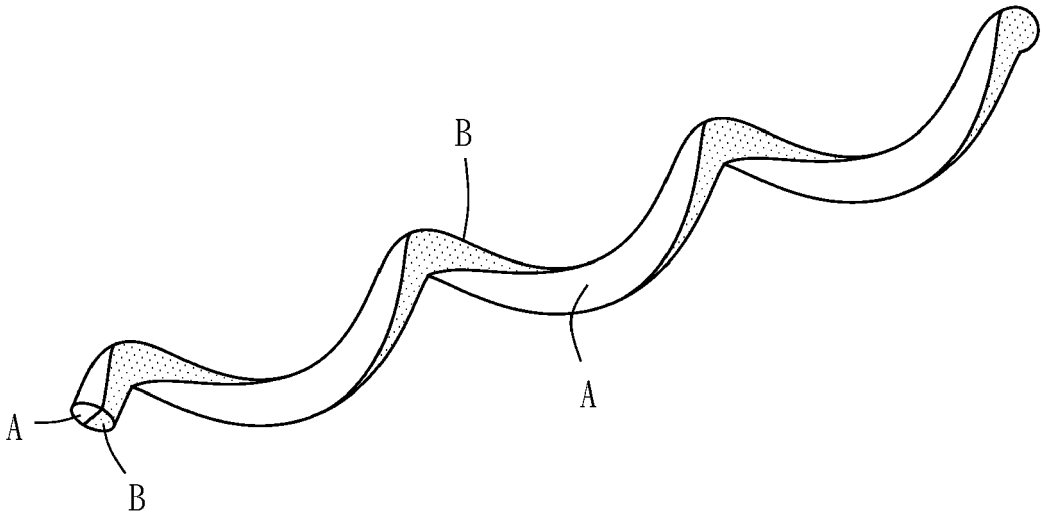

FIG. 2

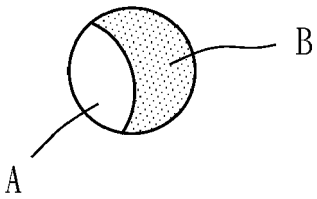

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 20 21 7879

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 101 718 008 A (SHANGHAI VIAT TECHNOLOGY CO LT) 2 June 2010 (2010-06-02) * paragraphs [0007] - [0010], [0032], [0033]; figures 2a-2c; example 8 * -----	1-5	INV. D01D5/32 D01D5/22 D01F8/14 D01F8/12
X	KR 2010 0070202 A (WOONGJIN CHEMICAL CO LTD [KR]) 25 June 2010 (2010-06-25) * abstract; claims 1-12 * -----	1-5	
X	CN 111 379 048 A (HANGZHOU YIJING CHEMICAL FIBER CO LTD) 7 July 2020 (2020-07-07) * abstract; claims 1-4; examples 1-5 * -----	1-5	
A	CN 1 772 984 A (XINGUANG SYNTHETIC FIBRE CO LT [CN]) 17 May 2006 (2006-05-17) * abstract; claims 1-17; figures 3A-3C * -----	1-5	
			TECHNICAL FIELDS SEARCHED (IPC) D01D D01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 May 2021	Malik, Jan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 21 7879

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-05-2021

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82