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(54) BICOMPONENT CONJUGATE FIBERS, COMPLEX YARNS AND FABRICS HAVING HIGH CRIMPING PROPERTY

(57) The present invention relates to bicomponent conjugate fibers having excellent crimping property, comprising: (A) a thermoplastic polyester elastomer (TPEE) as a first component, and (B) a polyester polymer as a second component. The present invention also relates to yarns and fabrics comprising said bicomponent conjugate fibers.

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to bicomponent conjugate fibers having excellent crimping property, comprising: (A) a thermoplastic polyester elastomer (TPEE) as a first component, and (B) a polyester polymer as a second component. The present invention also relates to yarns and fabrics comprising said bicomponent conjugate fibers.

BACKGROUND OF THE INVENTION

[0002] Self-crimping properties of conjugate fibers can mainly be generated from the manufacturing process of side-by-side bicomponent fibers. Due to different intrinsic viscosity (IV) between two polymers for forming the conjugate fibers, said two polymers have different shrinkages which lead to three-dimensional crimp of the fibers. Self-crimping property is a crimping potential inevitably created by differences in the amount of shrinkage, the degree of shrinkage and the module of elasticity of the two polymers. In addition to shrinkage differences as a prerequisite for self-crimping property, good adherence must be present between said two polymers. However, it is not absolutely necessary to utilize different polymers, since a shrinkage difference can also be caused by differences in orientation, crystallinity or relative viscosity. In general, the shrinkage difference of polymers produced by the same materials is smaller and therefore, it is not easy to produce high shrinkage required by the demand of high elasticity. For example, Japanese Patent Laid-Open Application No. 2001-226832 utilizes materials of polyethylene terephthalate (PET) having different intrinsic viscosities (PET having the intrinsic viscosity of 0.76 dl/g in combination with PET having the intrinsic viscosity of 0.53 dl/g are utilized in the examples of the patent application) for the production of high crimping bicomponent conjugate fibers. However, the CI (Crimp Index, i.e., a flexibility index) of the fibers produced by said method is not satisfactory.

SUMMARY OF THE INVENTION

[0003] The main object of the present invention is to provide bicomponent conjugate fibers having high crimping property and excellent resilience.

[0004] In one aspect of the present invention, the present invention relates to bicomponent conjugate fibers having excellent crimping property, which comprises (A) a thermoplastic polyester elastomer (TPEE) as a first component, and (B) a polyester polymer as a second component, wherein the weight ratio of the thermoplastic polyester elastomer (TPEE) as the first component to the polyester polymer as the second component is in the range of 20:80 ~ 80:20, preferably 30:70 ~ 70:30, and most preferably 40:60 ~ 60:40.

[0005] The molecular structure of the thermoplastic polyester elastomer consists of two parts, hard segments and soft segments, wherein the hard segments are aromatic polyesters, such as poly(ethylene terephthalate) (PET) or polybutylene terephthalate (PBT), and the soft segments are polyether esters.

[0006] In one embodiment of the present invention, the (A) thermoplastic polyester elastomer as the first component may be those in which the hard segments are polyesters (such as PET or PBT), and the soft segments are polyether esters, such as polytetramethylene ether glycol (PTMEG), wherein the weight ratio of the hard segments to the soft segments is in the range of 80:20 ~ 20:80, and the number average molecular weight of the polyether glycol is in the range of 500-5000.

[0007] When the viscosity of the thermoplastic polyester elastomer is less than 0.5 dl/g, the production yield of fibers is not good and the physical properties thereof are poor. When the viscosity of the thermoplastic polyester elastomer is higher than 2.4 dl/g, the flowability of polymers is poor and the melt temperature has to be elevated during the manufacturing period, and thus the polymers are liable to be degraded, resulting in a poor production yield. Therefore, in one embodiment of the present invention, the thermoplastic polyester elastomer as the first component has an intrinsic viscosity in the range of 0.5 ~ 2.4 dl/g, preferably 0.8 ~ 2.2 dl/g, and most preferably 1.1 ~ 1.9 dl/g.

[0008] When the viscosity of the polyester polymer is less than 0.45 dl/g, the production yield of fibers is not good and the physical properties thereof are poor. When the viscosity of the polyester polymer is higher than 1.2 dl/g, the flowability of polymers is poor and the melt temperature has to be elevated during the manufacturing period, and thus the polymers are liable to be degraded, resulting in a poor production yield. Therefore, in one embodiment of the present invention, the polyester polymer as the second component has an intrinsic viscosity in the range of 0.45 ~ 1.2 dl/g, preferably 0.45 - 0.85 dl/g, and most preferably 0.45 - 0.70 dl/g.

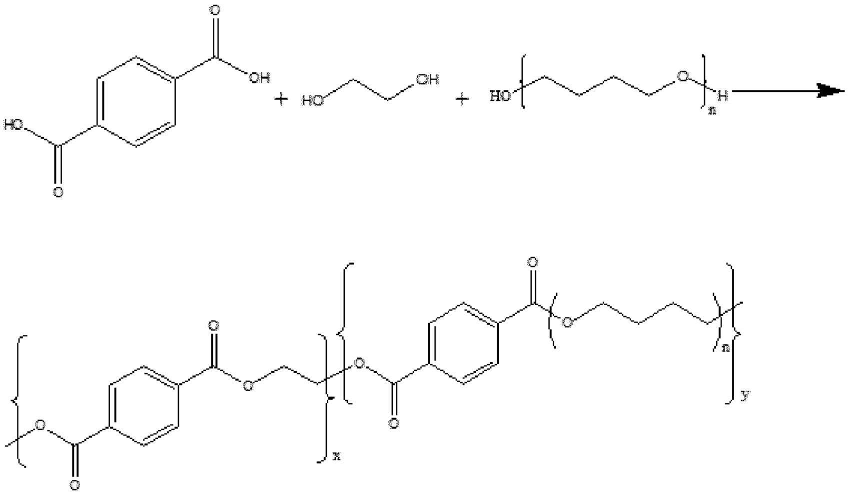
[0009] In another aspect of the present invention, the present invention relates to a process for the production of bicomponent conjugate fibers, which can be performed by utilization of a single-stage direct spin-drawing process. Said process comprises heating the first component and the second component as spinning materials in a screw extruder at a temperature of 220 - 300°C, respectively, depending on the kinds of materials as the first component and the second component (for example, a temperature of 220 - 290°C may be selected if a PBT-type TPEE is employed; and a temperature of 280 ~ 300°C may be selected if a PET-type TPEE is employed), so that they become a melt and are then spun from a side-by-side spinneret. After cooling and oiling, spinning and drawing are carried out at a spinning rate of 1000 ~ 6000 m/min, a drawing ratio of 1.0 ~ 10, a drawing temperature of 20 ~ 100°C and a heat setting temperature of 20 ~ 200°C, to produce high crimping bicomponent fully drawn yarns (FDY) or high oriented yarns (HOY).

[0010] In a further aspect, the bicomponent conjugate fibers of the present invention can also be produced by utilization of a multi-stage process of spinning followed by drawing or false-twist texturing. Said process comprises heating the first component and the second component as spinning materials in a screw extruder at a temperature of 220 ~ 300°C, respectively, depending on the kinds of materials as the first component and the second component (for example, a temperature of 220 ~ 290°C may be selected if a PBT-type TPEE is employed; and a temperature of 280 ~ 300°C may be selected if a PET-type TPEE is employed), so that they become a melt and are then quantitatively spun from a side-by-side spinneret. After cooling and oiling, winding is carried out at a spinning rate of 500 ~ 6000 m/min, followed by a drawing process, a false-twist texturing process for draw textured yarns (DTY) or an air false-twist texturing process for air textured yarns (ATY) at a processing rate of 100 ~ 1200 m/min, a hot plate temperature of 70 ~ 220°C and a drawing ratio of 1 ~ 10, to produce high crimping bicomponent fully drawn yarns (FDY) or textured yarns (such as DTY or ATY).

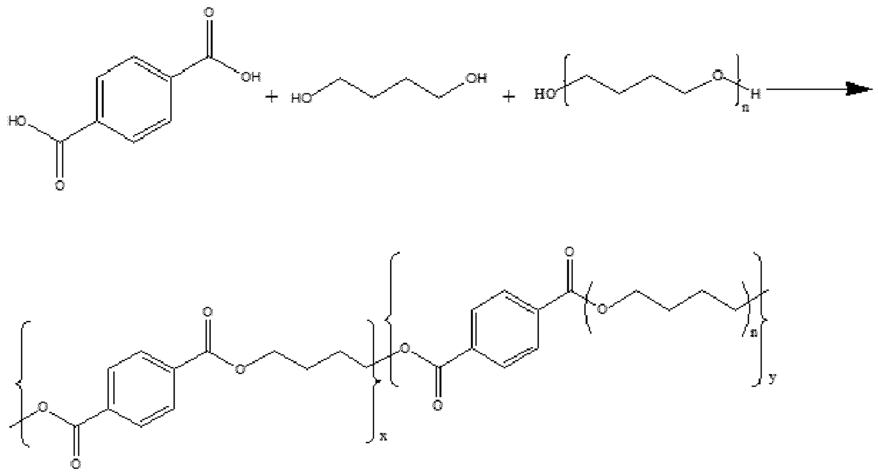
DETAIL DESCRIPTION OF THE INVENTION

[0011] In one embodiment, the thermoplastic polyester elastomer as the first component includes PET-type TPEE and PBT-type TPEE, which are formed respectively in the schemes as shown below:

TPA + EG + PTMEG → PET-TYPE TPEE



TPA + 1,4-BDO + PTMEG → PBT-TYPE TPEE



[0012] In said schemes, the above mentioned abbreviations have meanings as below:

TPA: terephthalic acid;
EG: ethylene glycol;
PTMEG: polytetramethylene ether glycol;
PET: polyethylene terephthalate;
TPEE: thermoplastic polyester elastomer; and
BDO: butanediol.

[0013] The thermoplastic polyester elastomer (TPEE) used in the present invention has an intrinsic viscosity in the range of 0.5 ~ 2.4 dl/g, preferably 0.8 ~ 2.2 dl/g, and most preferably 1.1 ~ 1.9 dl/g.

[0014] In one embodiment, the (B) polyester polymer as the second component may be selected from the group consisting of polyethylene terephthalate, polyethylene isoterephthalate, a copolymer of polyethylene terephthalate/polyethylene isoterephthalate, polybutylene terephthalate, cationic dyeable polyester, polybutylene succinate, environmentally recycled polyesters, biomass polyesters, and thermoplastic polyester elastomer; wherein the environmentally recycled polyesters and biomass polyesters may be environmentally recycled PET and biomass PET.

[0015] The polyester used in the present invention has an intrinsic viscosity in the range of 0.45 ~ 1.2 dl/g, preferably 0.45 ~ 0.85 dl/g, and most preferably 0.45 ~ 0.70 dl/g.

[0016] The bicomponent conjugate fibers of the present invention may be side-by-side bicomponent conjugate fibers. Namely, from the cross sectional view of the conjugate fibers, the above mentioned first component and second component are arranged in a side by side configuration.

[0017] The bicomponent conjugate fibers of the present invention may be in the form of continuous long filaments or short filaments.

[0018] The bicomponent conjugate fibers of the present invention may be in the form of a circular cross section or non-circular cross section.

[0019] In another embodiment of the present invention, the process for the production of the bicomponent conjugate fibers of the present invention may comprise addition of further functional additives, such as flame retardants, heat insulating agents, anti-ultraviolet agents, anti-statistic agents, fluorescent brighteners, antibacterial agents, matting agents, etc., depending on the demand.

[0020] The bicomponent conjugate fibers described in the present invention may be fibers of drawn textured yarns (DTY), air textured yarns (ATY), high oriented yarns (HOY), or fully drawn yarns (FDY).

[0021] In another aspect, the present invention relates to yarns and fabrics produced by the bicomponent conjugate fibers of the present invention.

[0022] Based on the side-by-side bicomponent conjugate fibers of the present invention, high crimping long-filament products or short-filament products may be produced depending on the demand.

[0023] Based on the bicomponent conjugate fibers of the present invention, the conjugate fibers may be present alone or further in complex with the other fibers to form complex yarns.

[0024] The present invention may also utilize the bicomponent conjugate fibers produced by the above mentioned process of production or conjugate fiber yarns comprising the bicomponent conjugate fibers of the present invention to produce fibers by means of textile manufacturing techniques known in the industry.

[0025] The physical properties of the side-by-side bicomponent conjugate fibers of the present invention are determined in the manners as described in detail below:

1. Intrinsic Viscosity (IV)

[0026] Intrinsic viscosity is determined by a method in accordance with ASTM D2857-87. The raw materials in each of the examples and comparative examples were dissolved to form test solutions. The flowing time of the test solutions in different concentrations (0.1%, 0.2%, 0.3%, 0.4%, 0.5%) and pure solvents in a capillary Ubbelohde viscometer is respectively measured, and the intrinsic viscosity of each test solution is determined. The intrinsic viscosity versus the concentration is then plotted. The intrinsic viscosity in the unit of dl/g is represented by the viscosity calculated by extrapolation when the concentration approaches 0%.

2. Fiber Strength and Elongation

[0027] The breaking strength and elongation of fibers are measured by an automatic elongation tester, STATIMAT M.

3. Crimp Index (CI)

[0028]

- Sample preparation: Fibers with a given fineness are wound on a winding machine comprising a filament winding section having a barrel with a perimeter of 1 m or 1.125 m. The crimp number of fibers is calculated in the following manner:

$$\text{Crimp number of fibers} = 3500 \div \text{fineness}$$

- Experiments are performed after the oven is set up at 120°C and maintained for 30 minutes.
- The fibers wound on the winding machine are taken out, and the fibers are hung on the wall in a vertical state. A weight of 10.5 g is hung on one end of the fibers, and a weight of 700 g is subsequently hung thereon. After 10 seconds, the lengths of the fibers are measured and recorded as L1.
- The weight of 700 g was taken out from the fibers, and the fibers still loaded with the weight of 10.5 g are placed in the oven maintaining at 120°C and dried for 5 minutes.
- After drying, the fibers still loaded with the weight of 10.5 g are taken from the oven and are hung on the wall again for 2 hours to allow for being cooled down. At this point of time, the lengths of the fibers are measured and recorded as L2.
- The weight of 700 g is further hung on the fibers. At this point of time, the lengths of the fibers are measured and recorded as L3.
- The crimp index (CI) is calculated based on the following formula:

$$\text{CI}\ \% = [(L3 - L2)/(L2)] \times 100\ \%$$

EXAMPLES

[0029] The following examples are used to illustrate the technical content of the present invention and the efficacy to be achieved, but are not intended to limit the present invention. Any equivalent changes and modifications made according to the invention are all within the scope of the claims of the invention.

Example 1

[0030] The bicomponent conjugate fibers of Example 1 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 1.8 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 0.45 dl/g was melted at the melt temperature of 280°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 20:80 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air and then spun and drawn at a spinning rate of 4000 m/min, a drawing temperature of 80°C, a heat setting temperature of 140°C and a drawing ratio of 2.1 to produce 75/24 bicomponent fully drawn yarns (FDY). The results of the produced fibers are shown in Table 1.

Example 2

[0031] The bicomponent conjugate fibers of Example 2 were prepared according to the production method described in Example 1, wherein the weight ratio of the first component and the second component was substituted with 50:50. The results of the produced fibers are shown in Table 1.

Example 3

[0032] The bicomponent conjugate fibers of Example 3 were prepared according to the production method described in Example 1, wherein the weight ratio of the first component and the second component was substituted with 80:20. The results of the produced fibers are shown in Table 1.

Example 4

[0033] The bicomponent conjugate fibers of Example 4 were prepared according to the production method described in Example 2, wherein the second component was substituted with a cationic dyeable polyester (CD) having the intrinsic viscosity of 0.56 dl/g. The results of the produced fibers were shown in Table 1.

Comparative Example 1

[0034] The bicomponent conjugate fibers of Comparative Example 1 were prepared according to the production method described in Example 2, wherein the first component was substituted with PET having a high intrinsic viscosity (0.75 dl/g), and the second component was substituted with PET having a low intrinsic viscosity (0.53 dl/g). The results of the produced fibers were shown in Table 1.

Table 1

	First component weight percentage (wt%)	Second component weight percentage (wt%)	Fiber Strength (g/d)	Fiber Elongation (E%)	Crimp Index (CI)
Example 1	PBT-TYPE TPEE/20wt%	PET/80wt%	4.2	33.1	66
Example 2	PBT-TYPE TPEE/50wt%	PET/50wt%	4.3	35.1	80
Example 3	PBT-TYPE TPEE/80wt%	PET/20wt%	3.5	34.8	80
Example 4	PBT-TYPE TPEE/50wt%	CD/50wt%	3.7	36.8	63
Comparative Example 1	PET/50 wt%	PET/50 wt%	3.7	33.0	5

Example 5

[0035] The bicomponent conjugate fibers of Example 5 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 0.5 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 0.45 dl/g was melted at the melt temperature of 280°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 50:50 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air and then spun and drawn at a spinning rate of 4000 m/min, a drawing temperature of 80°C, a heat setting temperature of 140°C and a drawing ratio of 2.1 to produce 75/24 bicomponent fully drawn yarns (FDY). The results of the produced fibers are shown in Table 2.

Example 6

[0036] The bicomponent conjugate fibers of Example 6 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 2.4 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 0.45 dl/g was melted at the melt temperature of 280°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 50:50 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air and then spun and drawn at the spinning rate of 4000 m/min, the drawing temperature of 80°C, a heat setting temperature of 140°C and a drawing ratio of 2.1 to produce 75/24 bicomponent fully drawn yarns (FDY). The results of the produced fibers are shown in Table 2.

Comparative Example 2

[0037] The bicomponent conjugate fibers of Comparative Example 2 were prepared according to the production method described in Example 2, wherein the first component was substituted with PBT-TYPE TPEE having the intrinsic viscosity of 0.45 dl/g. The results of the produced fibers are shown in Table 2.

Comparative Example 3

[0038] The bicomponent conjugate fibers of Comparative Example 3 were prepared according to the production method described in Example 2, wherein the first component was substituted with PBT-TYPE TPEE having the intrinsic viscosity of 2.5 dl/g. The results of the produced fibers are shown in Table 2.

Table 2

	First Component Intrinsic Viscosity (dl/g)	Second Component Intrinsic Viscosity (dl/g)	Fiber Strength (g/d)	Fiber Elongation (E%)	Crimp Index (CI)
Example 2	1.8	0.45	4.3	35.1	80
Example 5	0.5	0.45	2.5	35.1	8
Example 6	2.4	0.45	4.5	35.1	82
Comparative Example 2**	0.45	0.45	2.1	35.9	2
Comparative Example 3*	2.5	0.45	4.5	37.8	85
Note: * poor production yield. ** poor production yield and poor physical property.					

Example 7

[0039] The bicomponent conjugate fibers of Example 7 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 1.8 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 0.76 dl/g was melted at the melt temperature of 290°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 50:50 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air and then spun and drawn at the spinning rate of 4000 m/min, the drawing temperature of 80°C, a heat setting temperature of 140°C and a drawing ratio of 2.1 to produce bicomponent fully drawn yarns (FDY). The results of the produced fibers are shown in Table 3.

Example 8

[0040] The bicomponent conjugate fibers of Example 8 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 1.8 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 1.0 dl/g was melted at the melt temperature of 295°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 50:50 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air and then spun and drawn at the spinning rate of 4000 m/min, the drawing temperature of 80°C, a heat setting temperature of 140°C and a drawing ratio of 2.1 to produce bicomponent fully drawn yarns (FDY). The results of the produced fibers are shown in Table 3.

Comparative Example 4

[0041] The bicomponent conjugate fibers of Comparative Example 4 were prepared according to the production method described in Example 2, wherein the second component was substituted with PET having the intrinsic viscosity of 1.3

dl/g and was melted at a melt temperature of 300°C. The results of the produced fibers are shown in Table 3.

Table 3

	First Component Intrinsic Viscosity (dl/g)	Second Component Intrinsic Viscosity (dl/g)	Fiber Strength (g/d)	Fiber Enlogation (E%)	Crimp Index (CI)
Example 2	1.8	0.45	4.3	35.1	80
Example 7	1.8	0.76	4.4	33.5	47
Example 8	1.8	1.20	4.4	36.1	31
Comparative Example 4*	1.8	1.30	4.5	36.9	15
Note: * poor production yield.					

Example 9

[0042] The bicomponent conjugate fibers of Example 9 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 1.8 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 0.45 dl/g was melted at the melt temperature of 280°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 50:50 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air, wound at the spinning rate of 3000 m/min, and then processed by the FDY drawing process at the processing rate of 500 m/min and a drawing ratio of 1.8 to produce high crimping bicomponent fully drawn yarns (FDY). The results of the produced fibers are shown in Table 4.

Example 10

[0043] The bicomponent conjugate fibers of Example 10 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 1.8 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 0.45 dl/g was melted at the melt temperature of 280°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 50:50 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air, wound at the spinning rate of 3000 m/min, and then processed by the DTY false-twist texturing process at the processing rate of 500 m/min and a drawing ratio of 1.8 to produce high crimping bicomponent false-twist draw textured yarns (DTY). The results of the produced fibers are shown in Table 4.

Example 11

[0044] The bicomponent conjugate fibers of Example 11 were prepared according to the method as described below. By using a screw extruder, the PBT-TYPE TPEE (the first component) having the intrinsic viscosity of 1.8 dl/g was melted at the melt temperature of 250°C, and the PET (the second component) having the intrinsic viscosity of 0.45 dl/g was melted at the melt temperature of 280°C, which were then quantitatively discharged, respectively. The first component and the second component were mixed in a weight ratio of 50:50 and then placed in a spinning cabinet at a spinning temperature of 285°C, which were subsequently extruded through a complex and side-by-side spinneret assembly, cooled down with cooling air, wound at the spinning rate of 3000 m/min, and then processed by an air false-twist texturing process at the processing rate of 500 m/min and a drawing ratio of 1.8 to produce high crimping bicomponent air false-twist air textured yarns (ATY). The results of the produced fibers are shown in Table 4.

Table 4

	First Component Intrinsic Viscosity (dl/g)	Second Component Intrinsic Viscosity (dl/g)	Fiber Strength (g/d)	Fiber Elongation (E%)	Crimp Ibdex (CI)
Example 9	1.8	0.45	4.0	25.9	72
Example 10	1.8	0.45	3.6	25.0	65
Example 11	1.8	0.45	3.8	25.4	70

Example 12

[0045] The bicomponent conjugate fibers of Example 12 were prepared according to the production method described in Example 2, wherein the first component was substituted with PET-TYPE TPEE having the intrinsic viscosity of 1.1 dl/g. The results of the produced fibers are shown in Table 5.

Example 13

[0046] The bicomponent conjugate fibers of Example 13 were prepared according to the production method described in Example 2, wherein the first component was substituted with PET-TYPE TPEE having the intrinsic viscosity of 1.5 dl/g. The results of the produced fibers are shown in Table 5.

Example 14

[0047] The bicomponent conjugate fibers of Example 14 were prepared according to the production method described in Example 2, wherein the first component was substituted with PET-TYPE TPEE having the intrinsic viscosity of 1.8 dl/g. The results of the produced fibers are shown in Table 5.

Table 5

	First ComponentIntrinsic Viscosity (dl/g)	Second Component Intrinsic Viscosity (dl/g)	Fiber Strength (g/d)	Fiber Elongation (E%)	Crimp Index (CI)
Example 2	1.8	0.45	4.3	35.1	80
Example 12	1.1	0.45	3.8	31.8	38
Example 13	1.5	0.45	4.2	31.1	47
Example 14	1.8	0.45	4.4	30.3	55

Example 15

[0048] According to the production method described in Example 2, the first component was substituted with PBT-TYPE TPEE having the intrinsic viscosity of 1.8 dl/g and was melted at the melt temperature of 250°C, and the PBT-TYPE TPEE (the second component) having the intrinsic viscosity of 1.2 dl/g was melted at the melt temperature of 250°C. The produced fibers are shown in Table 6.

Example 16

[0049] According to the production method described in Example 2, the first component was substituted with PET-TYPE TPEE having the intrinsic viscosity of 1.8 dl/g and was melted at the melt temperature of 270°C, and the PBT-

TYPE TPEE (the second component) having the intrinsic viscosity of 1.2 dl/g was melted at the melt temperature of 250°C. The produced fibers are shown in Table 6.

Example 17

[0050] According to the production method described in Example 2, the first component was substituted with PBT-TYPE TPEE having the intrinsic viscosity of 1.8 dl/g and was melted at the melt temperature of 250°C, and the PET-TYPE TPEE (the second component) having the intrinsic viscosity of 1.2 dl/g was melted at the melt temperature of 260°C. The produced fibers are shown in Table 6.

Table 6

	First Component Intrinsic Viscosity (dl/g)	Second Component Intrinsic Viscosity (dl/g)	Fiber Strength (g/d)	Fiber Elongation (E%)	Crimp Index (CI)
Example 15	1.8	1.2	3.7	35.1	70
Example 16	1.8	1.2	3.8	31.8	55
Example 17	1.8	1.2	3.7	33.0	65

Claims

1. A bicomponent conjugate fiber comprising: (A) a thermoplastic polyester elastomer (TPEE) as a first component, and (B) a polyester polymer as a second component

2. The bicomponent conjugate fiber according to claim 1, wherein the thermoplastic polyester elastomer is a polybutylene terephthalate (PBT) type thermoplastic elastomer.

3. The bicomponent conjugate fiber according to claim 1, wherein the thermoplastic polyester elastomer is a poly(ethylene terephthalate) (PET) type thermoplastic elastomer.

4. The bicomponent conjugate fiber according to any one of claims 1 to 3, wherein the thermoplastic polyester elastomer has an intrinsic viscosity in the range of 0.5 dl/g to 2.4 dl/g.

5. The bicomponent conjugate fiber according to any one of claims 1 to 3, wherein the polyester polymer is selected from the group consisting of polyethylene terephthalate, polyethylene isoterephthalate, a copolymer of polyethylene terephthalate/polyethylene isoterephthalate, polybutylene terephthalate, cationic dyeable polyester, polybutylene succinate, environmentally recycled polyesters, biomass polyesters, and thermoplastic polyester elastomer.

6. The bicomponent conjugate fiber according to any one of claims 1 to 3, wherein the polyester polymer has an intrinsic viscosity in the range of 0.45 ~ 1.2 dl/g.

7. The bicomponent conjugate fiber according to any one of claims 1 to 3, wherein the weight ratio of the first component to the second component is in the range of 20:80 ~ 80:20.

8. The bicomponent conjugate fiber according to any one of claims 1 to 3, wherein the fibers have a side-by-side cross section.

9. The bicomponent conjugate fiber according to any one of claims 1 to 3, wherein the fibers are fibers of drawn textured yarns (DTY), air textured yarns (ATY), high oriented yarns (HOY), or fully drawn yarns (FDY).

10. The bicomponent conjugate fiber according to any one of claims 1 to 3, wherein the fibers are long filaments or short filaments.

11. Complex yarns which are composed of the fibers according to any one of claims 1 to 10 alone, or are formed by said bicomponent conjugate fibers in complex with the other fibers.

12. Fabrics produced from the bicomponent conjugate fibers according to any one of claims 1 to 10.

13. Fabrics produced by the complex yarns according to claim 11.

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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 1726

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	US 2012/121882 A1 (OKAYA HIROSHI [JP]) 17 May 2012 (2012-05-17) * paragraphs [0038], [0051], [0052], [0056], [0060], [0061], [0062], [0068], [0079], [0098], [99181] * -----	1-13	INV. D01F8/14
X	US 2008/187751 A1 (WARD BENNETT C [US] ET AL) 7 August 2008 (2008-08-07) * paragraphs [0004], [0021], [0028], [0033], [0037], [0038]; figure 1 * -----	1-3,5, 7-13	

TECHNICAL FIELDS SEARCHED (IPC)

D01F
D01D
D02G

The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
The Hague	18 April 2016	Van Beurden-Hopkins

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons
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& : member of the same patent family, corresponding document

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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18-04-2016

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