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(54) **Resilient multicomponent fibers and fabrics formed of the same**

(57) Disclosed are multicomponent fibers wherein at least one component comprises poly(1,4-cyclohexylene dimethylene terephthalate), advantageously forming at least a portion of an exposed surface of the multicomponent fiber. The fibers also include at least one additional polymeric component formed of a fiber-forming polymer.

EP 1 074 644 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to multicomponent fibers, and more particularly multicomponent fibers having a resilient polymeric component, as well as articles incorporating the fibers as a component thereof.

BACKGROUND OF THE INVENTION

[0002] Synthetic polymers have been widely used in the manufacture of fibers, films, molded articles, and the like. Common thermoplastic polymers used in the production of these and other products include polyolefins, such as polypropylene and polyethylene, polyesters, such as polyethylene terephthalate, and polyamides, among others. Typically a particular polymer is selected based upon the desired physical properties of the end product. For example, polyethylene terephthalate has excellent physical properties and is used to produce relatively low cost textile fibers of superior tensile strength, high wear resistance, and stability to heat and moisture. Other polyesters, such as poly(1,4-cyclohexylene dimethylene terephthalate), also have good heat and hydrolysis resistance, among other properties such as resilience. Indeed, fibers made of poly(1,4-cyclohexylene dimethylene terephthalate) have resilience approaching and even superior to that exhibited by nylon fibers. However, poly(1,4-cyclohexylene dimethylene terephthalate) is a relatively expensive polymer, thus making its use commercially impractical in many applications.

[0003] Fibers formed of synthetic polymers and fabrics produced therefrom are useful in a wide variety of applications, such as components in disposable absorbent articles, such as diapers, medical fabrics, such as surgical drapes and sterile wraps, filtration media, and the like. Multicomponent or bicomponent fibers have been developed to impart desirable combinations of physical properties to fabrics produced using the same. Generally a bicomponent fiber may be described as a fiber having different polymeric components arranged in distinct zones across the cross section of the fibers. Typically one of the polymeric components exhibits different properties than the other so that the fibers exhibit properties of the two components. As a primary example conventionally bicomponent fibers include an outer polymeric sheath component, such as polyethylene, surrounding a core polymeric material, such as polyester. Generally, the sheath component is formed of a polymer composition having a melting point that is lower (the "low melt" component) than the melting point of the polymer composition of the core (the "high melt" component). The low melt polymer acts as a latent adhesive upon thermal treatment to bond the fibers and form a coherent textile structure.

[0004] In addition, many bicomponent fibers include polymer domains of specific chemistries and arrangement so that the fibers develop a helical crimp. For example, the polymers of the bicomponent fibers can have differential shrink properties so as to impart a helical or spiral configuration to the fiber during formation or subsequent processing. In this regard, a side-by-side fiber or eccentric sheath core fiber is required for crimping. Crimped fibers are considered desirable for many reasons. For example, crimped fibers exhibit increased loft imparted by the three dimensional configuration resulting from crimping.

SUMMARY OF THE INVENTION

[0005] The present invention provides multicomponent fibers which exhibit a number of desirable properties in a single fiber structure. The fibers of the invention include a poly(1,4-cyclohexylene dimethylene terephthalate) ("PCT") polymeric component which occupies at least a portion, and preferably the entire, outer surface of the fibers. Thus the fibers of the invention can exhibit desirable physical properties imparted thereto resulting from the presence of the PCT polymer, such as chemical, heat and moisture resistance, and the like. In addition. PCT polymers can provide fibers having desirable resilience.

[0006] The fibers of the invention also include at least one other polymeric component formed of one or more fiber forming polymers. The other fiber forming materials can be selected from any of the types of polymers known in the art which are capable of being formed into fibers, including polyolefins, polyesters, polyamides, and the like. Because the fibers of the invention include a polymeric component which is different from the PCT component, the cost of the fibers can be reduced, relative to fibers formed entirely of PCT polymer, because PCT polymer, which is expensive, can be replaced with a lower cost polymer. The fibers of the invention can also offer cost savings as compared to 100% polyamide fibers. Yet surprisingly the reduced amount of PCT polymer present in the fibers of the invention has been found to have minimal or essentially no impact on properties such as resilience, as compared to 100% PCT fibers or 100% nylon fibers.

[0007] The fibers of the invention possess substantially no latent crimpability. As used herein, the term "substantially no latent crimpability" refers to fibers of the invention which, when heated under relaxation, develop minimal or no crimp. The fibers can also be described as "non-self crimping." Advantageously, the fibers of the invention develop less than or about 2 CPI (crimps per inch of the fiber). In one embodiment of the invention, advantageously the fibers of the invention have a concentric sheath/core configuration, in which the sheath is formed of PCT and the core is formed of other fiber forming materials. In another advantageous embodiment of the invention, the fibers are islands in the sea fibers in which the sea polymer is PCT and the islands are formed of other fiber forming materials.

[0008] Although not wishing to be bound by any explanation of the invention, it is currently believed that the structure of the multicomponent fibers is advantageous in many regards. Because the fibers do not have substantial latent crimpability, the crimp level can be set to as specific level (number of crimps per inch and height of each crimp) when the fiber is mechanically crimped. Further, the desired crimp level can be maintained at any temperature below the melting point of the fiber. In contrast, for latent-crimpable fibers, the crimp level is a function of temperature. In addition, mechanically crimped fibers do not need the separate heating step required by self-crimping fibers.

[0009] The present invention also provides fabrics formed of the multicomponent fibers of the invention, articles incorporating such fabrics as a component, and processes for making the fibers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Some of the objects and advantages of the invention have been stated. Others will appear when taken in connection with the accompanying drawings, in which:

Figure 1 is a transverse cross sectional view of an exemplary multicomponent fiber of the invention; and

Figure 2 is another transverse cross sectional view of another exemplary multicomponent fiber of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0011] The present invention will be described more fully hereinafter in connection with illustrative embodiments of the invention which are given so that the present disclosure will be thorough and complete and will fully convey the scope of the invention to those skilled in the art. However, it is to be understood that this invention may be embodied in many different forms and should not be construed as being limited to the specific embodiments described and illustrated herein. Although specific terms are used in the following description, these terms are merely for purposes of illustration and are not intended to define or limit the scope of the invention.

[0012] Turning to Figure 1, a transverse cross sectional view of an exemplary multicomponent fiber **10** of the invention is illustrated. Figure 1 illustrates one advantageous embodiment of the invention, namely, bicomponent fibers having an inner core polymer domain **12** and surrounding sheath polymer domain **14**. Figure 2 illustrates another advantageous embodiment of the invention in which the multicomponent fibers **10'** of the invention are "matrix" or "islands in a sea" type fibers having an "island" polymer component **12'** surrounded by a "sea" polymer component **14'**. Other structured fiber configurations as known in the art may potentially be used, such as but not limited to, multicomponent fibers having unconventional shapes (such as multi-lobal fibers) as known in the art

[0013] As used herein, the term "multicomponent fibers" includes staple and continuous filaments prepared from two or more polymers present in discrete structured domains in the fiber, as opposed to blends where the domains tend to be dispersed, random or unstructured. For purposes of illustration only, the present invention will generally be described in terms of a bicomponent fiber comprising two components. However, it should be understood that the scope of the present invention is meant to include fibers with two or more structured components.

[0014] The multicomponent fibers of the invention include at least two structured polymeric components arranged in substantially constantly positioned distinct zones across the cress section of the multicomponent fiber and extending continuously along the length of the multicomponent fiber. At least one of the polymeric components comprises a poly(1,4-cyclohexylene dimethylene terephthalate) polymer (also referred to herein as "PCT"). To impart the desirable propenies of the PCT polymer to the fibers of the invention, such as resilience, hydrolysis resistance, heat resistance, and the like, advantageously at least a portion of the outer surface of the fibers comprises PCT polymer. In a preferred embodiment of the invention, the entire outer surface of the fiber comprises PCT polymer.

[0015] PCT polymers can be generally described as polyalkylene terephthalate resins based on the reactions between 1,4-cyclohexanedimethanol and terephthalic acid or suitable synthetic equivalents. PCT polymers useful in the invention typically have an inherent viscosity of about 0.5 to about 1.0 and a melting point of about 290°C.

[0016] The dicarboxylic acid component of the PCT polymer comprises terephthalic acid which may contain up to 10 mole percent, based on the acid component, of other aromatic dicarboxylic acids preferably having 6 to 14 carbon atoms, of aliphatic dicarboxylic acids preferably having 4 to 12 carbon atoms, or of cycloaliphatic dicarboxylic acids preferably having 8 to 12 carbon atoms. Examples of such dicarboxylic acids include phthalic acid, isophthalic acid, naphthalene-2,6-dicaroxliuc acid, cyclohexanedicarboxylic acid, cyclohexanediacetic acid, diphenyl-4,4'-dicarboxylic acid, succinic acid, sebacic acid, adipic acid, glutaric acid, azelic acid, and the like and mixtures thereof.

[0017] The diol component of the PCT polymer comprises 1,4-cyclohexanedimethanol which may further contain up to 10 mole percent, based on the diol component, of other cycloaliphatic diols preferably having 6 to 15 carbon atoms, or aliphatic diols preferably having 3 to 8 carbon atoms. Examples of such diols include diethylene glycol, triethylene glycol, propane-1,3-diol, butane-1,4-diol, pentane-1,5-diol, hexane-1,6-diol., 3-methylpentanediol-(2,4), 2-methylpentane diol-(1,4), 2,2,4-trimethylpentane diol-(1,3), 2-ethylhexane-diol-(1,3), 2,2-diethylpropane diol (1,3), hexanediol-(1,3), 1,4-di(hydroxyethoxy)-benzene, 2,2-bis-(4-hydroxycyclohexyl)propane, 2,4-dihydroxy-1,1,3,3-tetramethyl-cyctobutane, 2,2-bis-(3-hydroxyethoxyphenyl)-propane, 2,2-bis-)4-hydroxypropoxy-phenyl)propane, and the like and mixtures thereof. PCT polymers comprising substantially only 1,4-cyclohexane dimethanol; and terephthalic acid monomer units are preferred for use in the present invention.

[0018] The PCT polymer may be in the cis or trans isomeric configuration or a mixture of the two. PCT polymers are known in the art and are commercially available or may be prepared by processes well known in the art. For example, the PCT polymers may be prepared by direct condensation of terephthalic acid or ester interchange using dimethyl terephthalate with the selected diol. See also, for example, U.S. Patent No. 2,901,466. An exemplary commercially available PCT polymer includes without limitation PCT 3879, commercially available from Eastman Chemical Co.

[0019] At least one other of the polymeric components comprises any of the various fiber forming polymer materials as known in the art. Such materials include without limitation polyolefins including polypropylene, polyethylene (low density polyethylene, high density polyethylene, linear low density polyethylene), and polybutene, polyesters including polyethylene terephthalate, polybutylene terephthalate, polytrimethylene terephthalate, and poly(lactic acid), polyamides including nylon, polyacrylates, polystyrenes, polyurethanes, acetal resins, polyethylene vinyl alcohol, thermoplastic elastomers and copolymers, terpolymers, and mixtures thereof.

[0020] Each of the polymeric components of the multicomponent fibers of the invention can optionally include other components not adversely effecting the desired properties thereof. Exemplary materials which could be used as additional components would include, without limitation, pigments, antioxidants, stabilizers, surfactants, waxes, flow promoters, solid solvents, particulates, and other materials added to enhance processability of the polymeric components. Such additives can be used in conventional amounts.

[0021] The weight ratio of the respective polymeric components of the fibers of the invention can vary. Advantageously, the weight ratio of the polymeric components ranges from about 10:90 to 90:10, preferably from about 30:70 to about 70:30, and more preferably from about 40:60 to about 60:40.

[0022] The fibers of the invention possess substantially no latent crimpability, meaning that the fibers develop minimal or no crimp when heated under relaxation. Generally the fibers develop no more than about two crimps per inch ("CPI") of fiber measured using conventional techniques known in the art when heated under relaxation. The term CPI as used herein has its conventional meaning in art and is determined using standard techniques know to the skilled artisan. Specifically, CPI refers to the number of two or three dimensional configurations per inch of a given sample of fiber under zero stress determined using ASTM D-3937.

[0023] The polymer domains of the fibers of the invention are selected and structured so that the fibers have substantially no latent crimpability (i.e., develop 2 or fewer CPI when heated under relaxation). It is generally known in the art that bicomponent fibers can take up a thee dimensional configurations, such as a helical or spiral configuration, during their formation and/or subsequent processing as a result of differences between the components of the fibers. Typically such "crimpable" bicomponent fibers have either a side-by side arrangement or an eccentric sheath/core arrangement so that the resulting filaments exhibit a natural helical crimp. In contrast to crimpable fiber configurations, the fibers of the invention exhibit minimal or no crimp during formation and/or subsequent processing. Stated differently, the polymer components are arranged such that substantial crimp (i.e. more than about 2 CPI) does not develop during processing or subsequent treatments. Thus, the multicomponent fibers are structured such that the fiber does not develop substantial crimp (i.e., less than or about 2 CPI) upon formation and/or subsequent processing.

[0024] The cross section of the multicomponent fiber is preferably circular, since the equipment typically used in the production of multicomponent synthetic fibers normally produces fibers with a substantially circular cross section. In the present inventions the configuration of the first and second polymer components in a fiber of circular cross section is substantially concentric so as to provide a non-self crimping or non-latently crimpable fiber. The concentric configuration is characterized by the first component having a substantially uniform thickness, such that the second component lies approximately in the center of the fiber. This is in contrast to an eccentric configuration, in which the thickness of the first component varies, and the second component therefore does not lie in the center of the fiber. When the fiber of the invention is a sheath/core bicomponent fiber, a concentric sheath/core structure is used in which the center of the core component is preferably biased by no more than about 0 to about 30 percent, preferably no more than about 0 to about 10 percent, based on the diameter of the sheath/core bicomponent fiber, from the center of the sheath component.

[0025] The polymeric components of the fibers can be selected so that the PCT polymer domain has a higher melting or softening temperature than other of the polymeric components. This is in contrast to conventional multicomponent fiber structures, which typically include a lower melt polymer on the outer surface of the fiber to act as a latent adhesive and to provide useful thermal bonding properties. In this aspect of the invention, the PCT polymeric component can have a melting or softening point of at least 10°C, or more, greater than the melting point of the other polymeric component(s)

[0026] Methods for making multicomponent fibers arc well known and need not be described here in detail. Generally, to form a multicomponent fiber, at least two polymers are extruded separately and fed into a polymer distribution system wherein the polymers are introduced into a spinneret plate. The polymers follow separate paths to the fiber spinneret and are combined in a spinneret hole. The spinneret is configured so that the extrudant has the desired overall fiber cross section (e.g., round, trilobal, etc.).

[0027] Following extrusion through the die, the resulting thin fluid strands, or filaments, remain in the molten state for some distance before they are solidified by cooling in a surrounding fluid medium, which may be chilled air blown through the strands. Once solidified, the filaments are taken up on a godet or another take-up surface, in a continuous filament process, the strands can be taken up on a godet which draws down the thin fluid streams in proportion to the speed of the take-up godet. In the spunbond process, the strands are collected in a jet, such as for example, an air attenuator, and blown onto a take-up surface such as a roller or a moving belt to form a spunbond web. In the meltblown process, air is ejected at the surface of the spinnerette which serves to simultaneously draw down and cool the thin fluid screams as they are deposited on a take-up surface in the path of cooling air, thereby forming a fiber web. Regardless of the type of melt spinning procedure which is used, generally the thin fluid streams are melt drawn down in a molten state, i.e. before solidification occurs to orient the polymer molecules for good tenacity. Typical melt draw down ratios known in the art may be utilized. The skilled artisan will appreciate that specific melt draw down is not required for meltblowing processes. Where a continuous filament or staple process is employed, it may be desirable to draw the strands in the solid state with conventional drawing equipment, such as, for example, sequential godets operating at differential speeds. See, for example, U.S. Pat. No. 5,082,899.

[0028] Following drawing in the solid state, the continuous filaments may be mechanically crimped and cut into a desirable fiber length, thereby producing staple fiber. The length of the staple fibers generally ranges from about 25 to about 50 millimeters although the fibers can be longer or shorter as desired. See, for example, U.S. Pat. No. 4,789,592 to Taniguchi et al. and U.S. Pat. No. 5,336,552 to Strack et al.

[0029] The multicomponent fibers of the invention can be staple fibers, continuous filaments, or meltblown fibers. In general, staple fibers, multifilament, and spunbond fibers formed in accordance with the present invention can have a fineness of about 0.5 to about 100 denier per filament. Meltblown filaments can have a fineness of about 0.001 to about 10.0 denier. Monofilament fibers can have a fineness of about 50 to about 10,000 denier.

[0030] As noted above, the multicomponent fibers can be incorporated into a fabric Fibers other than the multicomponent fibers of the invention may be present as well, including any of the various synthetic and/or natural fibers known in the art. Exemplary synthetic fibers include polyolefin, polyester, polyamide, acrylic, rayon, cellulose acetate, polyaramids, thermoplastic multicomponent fibers (such as conventional sheath/core fibers, for example polyethylene sheath/polyester core fibers) and the like and mixtures thereof. Exemplary natural fibers include wool, cotton, wood pulp fibers and the like and mixtures thereof.

[0031] In a preferred embodiment, the multicomponent fiber of the instant invention is incorporated into a nonwoven fabric. Staple fibers of the present invention may be formed into nonwoven webs by any means known in the art, including dry laid processes, such as carding or airlaying, as well as wet laid processes. In addition, continuous filament may be spun directly into nonwoven webs by a spunbonding process. The multicomponent fibers of the invention may also be incorporated, alone or in conjunction with other fibers, into a meltblown nonwoven fabric. The technique of meltblowing is known in the art and is discussed in various patents, e g., Buntin et al., U.S. Patent No 3,987,185; Buntin, U.S Patent No. 3,972,759; and McAmish et al., U.S. Patent No. 4,622,259. The nonwoven webs thus formed are typically subsequently bonded to transform them into nonwoven fabrics, using bonding technique known in the art, such as thermal bonding, mechanical bonding, adhesive bonding and the like. Although the fibers of the invention are advantageously formed into nonwoven fabrics, the present invention also includes other textile structures formed of the fibers of the invention, such as woven and knit fabrics.

[0032] Nonwoven fabrics which include the multicomponent fibers of the invention are useful as a component in a variety of end applications. For example, the fabrics can be used as a filter media in a broad range of applications, including use in bag filters, air filters, mist eliminators, stackhouse filters, and the like. The fabrics are particularly advantageous as a filter media for severe or harsh environments because the respective polymer components can be selected to provide the desired heat, hydrolysis and chemical resistance for a particular end application. In this regard, the fibers of the invention in which the PCT polymer domain encapsulates the other polymer domains are particularly advantageous.

[0033] The filtration media fabrics of the invention can, for example, be used as a component of a bag filter as known in the art. Such bag filters can have a variety of end uses and can generally be used in all applications in which conventional bag filters are currently being used, as well as more demanding applications in view of the superior nature of the present fibers. For example the fabrics can be incorporated as a component of a bag filter used to filter gaseous and liquid streams.

[0034] The fabrics of the invention are also useful in other constructions, for example, fabric applications requiring good resilience, such as imparted by the PCT polymer component. The PCT polymer can exhibit resiliency greater than nylon, which makes its use attractive in applications requiring resilience. In this regard, the fabrics of the invention can be useful as a component of the outer covering used in paint rollers.

[0035] The present invention will be further illustrated by the following non-limiting example.

EXAMPLE 1

[0036] Continuous sheath/core multi-filament melt spun fiber is produced using a bicomponent extrusion system. The sheath component of the bicomponent fiber comprises a PCT polymer, commercially available under the trade name PCT 3879 from Eastman Chemical Co., and the core component comprises polypropylene, commercially available under the trade name Martex HGZ-120-04 from Philips Sumika Polypropylene Co. The weight ratio of sheath/core components is 50/50. The two components are subjected to sheath-and-core type conventional bicomponent melt spinning. The filaments are subsequently drawn thereby yielding a 6 denier multifilament fiber. A sliver knit fabric formed with the fibers is made into a paint roller cover that provides 25% higher paint take-up and 25% faster paint release than a comparable roller made with polyethylene terephthalate (PET) fibers.

[0037] Many modifications and other embodiments of the invention will come to mind to one skilled in the art to which this invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims, Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

Claims

1. A multicomponent fiber having substantially no latent crimpability comprising

a first polymeric component forming at least a portion of an exposed surface of the multicomponent fiber and comprising poly(1,4-cyclohexylene dimethylene terephthalate) polymer; and

a second polymeric component comprising a fiber-forming polymer.

2. The fiber of Claim 1, wherein said first and second polymeric components are arranged so that the fiber develops two or fewer crimps per inch when heated under relaxation.

3. The fiber of Claim 1, wherein said fiber-forming polymer is selected from the group consisting of polyolefins, polyesters, polyamides, polyacrylates, polystyrenes, polyurethanes, acetal resins, polyethylene vinyl alcohol, thermoplastic elastomers and blends and co- and terpolymers thereof.

4. The fiber of Claim 1, wherein said fiber-forming polymer is a polyolefin.

5. The fiber of Claim 1, wherein said fiber-forming polymer is polypropylene.

6. The fiber of Claim 1, wherein said poly(1,4-cyclohexylene dimethylene terephthalate has a melting temperature of at least about 10°C higher than the melting temperature of said fiber-forming polymer.

7. The fiber of Claim 1, wherein said fiber is a concentric sheath/core fiber, wherein said sheath comprises poly(1,4-cyclohexylene dimethylene terephthalate) and said core comprises said fiber-forming polymer.

8. The fiber of Claim 7, wherein the center of said core component is biased by no more than about 0 to about 30%, based on the diameter of the sheath/core bicomponent fiber, from the center of said sheath component.

9. The fiber of Claim 1, wherein said fiber is an islands in the sea fiber, wherein said sea comprises poly(1,4-cyclohexylene dimethylene terephthalate) and said islands comprise said fiber-forming polymer.

10. The fiber of Claim 1, wherein said fiber is selected from the group consisting of continuous filaments, staple fibers, and meltblown fibers.

11. A concentric sheath/core bicomponent fiber, comprising;

a sheath component comprising poly(1,4-cyclohexylene dimethylene terephthalate) polymer; and

a core component comprising a fiber-forming polymer.

12. The fiber of Claim 11, wherein the center of said core component is biased by no more than about 0 to about 30%, based on the diameter of the sheath/core bicomponent fiber, from the center of said sheath component.

13. The fiber of Claim 11, wherein said fiber-forming polymer is selected from the group consisting of polyolefins, polyesters, polyamides, polyacrylates, polystyrenes, polyurethanes, acetal resins, polyethylene vinyl alcohol, thermoplastic elastomers and blends and co- and terpolymers thereof.

14. The fiber of Claim 11, wherein said fiber-forming polymer is a polyolefin.

15. The fiber of Claim 11, wherein said fiber-forming polymer is polypropylene.

16. An islands in the sea fiber comprising:

a polymeric sea component comprising poly(1,4-cyclohexylene dimethylene terephthalate polymer; and
a plurality of polymeric island components comprising a fiber-forming polymer.

17. A process for making a multicomponent fiber, comprising:

extruding a poly(1,4-cyclohexylene dimethylene terephthalate) polymer and at least one other fiber-forming polymer to produce a plurality of multicomponent fibers having distinct polymer domains, at least one of said polymer domains comprising said poly(1,4-cyclohexylene dimethylene terephthalate) polymer and forming at least a portion of the exposed surface of the fiber and at least another of said polymer domains comprising said fiber forming polymer, said polymer domains being structured to provide a fiber having substantially no latent crimpability

18. The process of Claim 17, wherein said polymer domains are structured so that said fiber develops two or fewer crimps per inch when heated under relaxation.

19. The process of Claim 17, wherein said fiber is selected front the group consisting of concentric sheath/core fibers and islands in the sea fibers.

20. A fabric comprising a plurality of multicomponent fibers having substantially no latent crimpability, said multicomponent fibers comprising:

a first polymeric component forming at least a portion of an exposed surface of the multicomponent fiber and comprising poly(1,4-cyclohexylene dimethylene terephthalate) polymer; and
a second polymeric component comprising a fiber-forming polymer.

21. The fabric of Claim 20, wherein said first and second polymeric components are arranged so that the fiber develops two or fewer crimps per inch when heated under relaxation.

22. The fabric of Claim 20, wherein said fiber-forming polymer is selected from the group consisting of polyolefins, polyesters, polyamides, polyacrylates, polystyrenes, polyurethanes, acetal resins, polyethylene vinyl alcohol, thermoplastic elastomers and blends and co- and terpolymers thereof.

23. The fabric of Claim 20, wherein said fiber-forming polymer is a polyolefin.

24. The fabric of Claim 20, wherein said fiber-forming polymer is a polypropylene.

25. The fabric of Claim 20, wherein said poly(1,4-cyclohexylene dimethylene terephthalate has a melting temperature of at least about 10°C higher than the melting temperature of said fiber-forming polymer.

26. The fabric of Claim 20, wherein said fiber is a concentric sheath/core fiber, wherein said sheath comprises poly(1,4-cyclohexylene dimethylene terephthalate) and said core comprises said fiber-forming polymer.

27. The fabric of Claim 26, wherein the center of said core component is biased by no more than about 0 to about 30%, based on the diameter of the sheath/core bicomponent fiber, from the center of said sheath component.

28. The fabric of Claim 20, wherein said fiber is an islands in the sea fiber, wherein said sea comprises poly(1,4-cyclohexylene dimethylene terephthalate) and said islands comprise said fiber-forming polymer.

29. The fabric of Claim 20, wherein said fiber is selected from the group consisting of continuous filaments, staple fibers, arid meltblown fibers.

30. The fabric of Claim 20, wherein said fabric is selected from the group consisting of nonwoven fabric, woven fabrics, and knit fabrics.

31. The fabric of Claim 20, wherein said fabric further comprises fibers selected from the group consisting of synthetic fibers and natural fibers.

32. A filtration media fabric comprising a plurality of multicomponent fibers having substantially no latent crimpability, said multicomponent fibers comprising:

a first polymeric component forming at least a portion of an exposed surface of the multicomponent fiber and comprising poly(1,4-cyclohexylene dimethylene terephthalate, polymer; and a second polymeric component comprising a fiber-forming polymer.

33. An article comprising at least one fabric comprising a plurality of multicomponent fibers having substantially no latent crimpability comprising:

a first polymeric component forming at least a portion of an exposed surface of the multicomponent fiber and comprising poly(1,4-cyclohexylene dimethylene terephthalate) polymer; and a second polymeric component comprising a fiber-forming polymer.

34. The article of Claim 33, wherein said fabric is a filtration media.

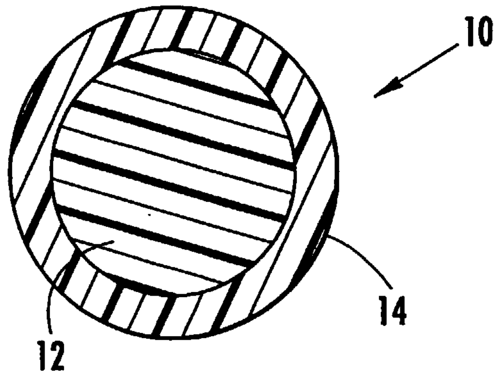

FIG. 1.

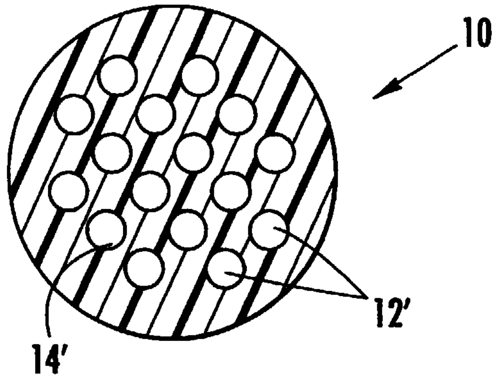

FIG. 2.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 11 6690

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	US 5 518 813 A (LEUMER GERHARD) 21 May 1996 (1996-05-21) * the whole document * ---	1-34	D01F8/14
Y	WO 96 39054 A (AMERICAN FILTRONA CORP ;BERGER RICHARD M (US)) 12 December 1996 (1996-12-12) * the whole document * ---	1-34	
A	US 4 104 439 A (FUZEK JOHN FRANK) 1 August 1978 (1978-08-01) * the whole document * ---	1-34	
A	GB 1 276 442 A (E.I. DU PONT DE NEMOURS AND COMPANY) 1 June 1972 (1972-06-01) * the whole document * -----	1-34	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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 November 2000	Tarrida Torrell, J

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
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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