ment unit and expresses the linear mass density, the mass of a filament of 9000 meters length. Another parameter often used is tex, the mass of a filament of 1000 meters length. So, 1 tex is 9 denier. The molecular weight of the polyesters may range within wide ranges and may be as low as 5,000 (Mn). For different polyesters different molecular weights are suitable. PEF is a suggested alternative, but no actual examples of PEF fibers are disclosed.

WO2013/149222 and WO2013/149157 describe a single filament made from a PEF resin with a number average molecular weight of 20,100 and a PDI of 1.93, resulting in a weight average molecular weight of about 38,800. The resulting fiber had a denier of 10 (~1.1 tex). For the resulting material no fiber related parameters were provided. The filament described in WO2013/149222 and WO2013/149157 appears not to have a measurable tenacity.

Embodiments of the present invention seek to provide a process for the preparation of a fiber containing polyethylene-2,5-furan-dicarboxylate by melt spinning, which fiber may be excellent mechanical properties when the polyester is colorless when no dye or colorant was deliberately added, and when the polyester has a relatively high molecular weight. The polyester can then be drawn after spinning to a low linear density in the range of 0.05 to 2.0 tex per filament and may then show a remarkably high tenacity. It was found that when other diols, such as 1,3-propane diol, were used in the preparation of a polyester, the polyester did not show the same level of tenacity after having been drawn to a similar linear density.

According to a first aspect of the present invention, there is provided a process for the preparation of a fiber comprising polyethylene-2,5-furan-dicarboxylate, by melt spinning wherein a molten composition comprising polyethylene-2,5-furan-dicarboxylate having an intrinsic viscosity of at least 0.55 dl/g, determined in dichloroacetic acid at 25°C, wherein the molten composition further comprises 90 to 99 %wt polyethylene terephthalate, based on the total composition, is passed through one or more spinning openings to yield molten threads; wherein the molten threads are cooled to below the melting temperature of the composition to yield spun fibers; and

wherein the spun fibers are drawn to a linear density in the range of 0.05 to 2.0 tex per fiber.

According to a second aspect of the present invention, there is provided a fiber comprising polyethylene-2,5-furan-dicarboxylate having a linear density of 0.05 to 2.0 tex, wherein the polyethylene-2,5-furan-dicarboxylate has an intrinsic viscosity of at least 0.45 dl/g, determined in dichloroacetic acid at 25°C and

wherein the fiber further comprises 90 to 99 %wt polyethylene terephthalate, based on the total fiber.

According to a third aspect of the present invention, there is provided a yarn, comprising a plurality of fibers according to the second aspect.

According to a fourth aspect of the present invention, there is provided a knit, woven or non-woven article, comprising a yarn according to the third aspect.

According to a fifth aspect of the present invention, there is provided an article according to the fourth aspect, which is selected from a textile, a carpet and a tire cord.

Melt spinning is a well-known process. Sometimes the process is divided in a number of types of melt spinning.

In traditional methods of melt spinning fibers are formed by extruding a molten thermoplastic material through a plurality of fine, usually circular, die capillaries (a spinneret) as molten threads. These move downward through an area of controlled temperature where the molten threads are cooled to below the melting temperature of the thermoplastic material, and are eventually brought into contact with a spinning roller. This spinning roller (also known as the filament take-up roll) can provide an acceleration of the molten filaments as they leave the die capillaries. This filament take up roll may then be followed by one or

CLAIMS

1. Process for the preparation of a fiber comprising polyethylene-2,5-furan-dicarboxylate, by melt spinning, wherein a molten composition comprising polyethylene-2,5-furan-dicarboxylate having an intrinsic viscosity of at least 0.55 dl/g, determined in dichloroacetic acid at 25°C, wherein the molten composition further comprises 90 to 99 % wt polyethylene terephthalate, based on the total composition, is passed through one or more spinning openings to yield molten threads;
wherein the molten threads are cooled to below the melting temperature of the composition to yield spun fibers; and
wherein the spun fibers are drawn to a linear density in the range of 0.05 to 2.0 tex per fiber.

2. Process according to claim 1, wherein the molten composition further comprises at least one polymer different from polyethylene-2,5-furan-dicarboxylate.

3.Process according to claim 2, wherein the at least one polymer different from polyethylene-2,5-furan-dicarboxylate has been selected from polyolefins, polyamides, polyesters and combinations thereof.

4.Process according to any one of claims 1 to 3, wherein the spun fibers are drawn in a secondary drawing step at a draw ratio of 1:1.4 to 1:6.0.

5.Process according to any one of claims 1 to 4, wherein the spun fibers are combined to a multifilament yarn before or after being drawn.

6.Process according to any one of claims 1 to 5, wherein the molten composition is kept at a temperature of 20 to 70 °C above the melting temperature of the molten composition..

7.Process according to any one of claims 1 to 6, wherein the spun fibers are drawn at a temperature of between glass transition temperature and the melting temperature of the polymer composition.

8. Process according to any one of claims 1 to 7, wherein the polyethylene-2,5-furan-dicarboxylate has an intrinsic viscosity in the range of 0.55 to 1.55 dl/g, determined in dichloroacetic acid at 25°C.

9.Process according to any one of claims 1 to 8, wherein the spun fibers are textured.

10. Process according to any one of claims 1 to 9, wherein the fibers after drawing are subjected to a spin finishing step by treating the fibers with a liquid.

11. Process according to any one of claims 1 to 10, wherein the fibers after drawing are subjected to a dyeing technique, preferably selected from carrier or carrier free dyeing, high temperature and high pressure (HTHP) dyeing, thermosol dyeing, plasma techniques, solvent free, supercritical CO2-based dyeing, dyeing using swelling agents and combinations thereof.

12. Process according to any one of claims 1 to 11, wherein the polyethylene-2,5-furan-dicarboxylate has been modified by the introduction of a third monomer to facilitate dyeing, which third monomer contains functionalized groups or disturbs the regularity of the chain of the polyethylene-2,5-furan-dicarboxylate.

13.Fiber comprising polyethylene-2,5-furan-dicarboxylate having a linear density of 0.05 to 2.0 tex, wherein the polyethylene-2,5-furan-dicarboxylate has an intrinsic viscosity of at least 0.45 dl/g, determined in dichloroacetic acid at 25°C and wherein the fiber further comprises 90 to 99 % wt polyethylene terephthalate, based on the total fiber.

14. Fiber according to claim 13, having a linear density of 0.05 to 0.5 tex.

15. Fiber according to claim 13 or 14, which has a tenacity of 200 to 1,000 mN/tex.

16. Fiber according to any one of claims 13 to 15, wherein the polyethylene-2,5-furan-dicarboxylate has an intrinsic viscosity in the range of 0.45 to 0.85 dl/g, determined in dichloroacetic acid at 25°C.

17. Fiber according to any one of claims 13 to 16, wherein the fiber has a birefringence in the range of 0.01 to 0.4.

18.Fiber according to any one of claims 13 to 17, wherein the fiber has a crystallinity of at least 5 J/g, preferably at least 10 J/g, more preferably at least 30 J/g, as determined by Differential Scanning Calorimetry (DSC).

19. Fiber according to any one of claims 13 to 18, wherein the fiber has been obtained by drawing an undrawn spun fiber at a draw ratio of 1:1.4 and 1:6.0 in a secondary drawing step.

20. Fiber according to any one of claims 13 to 19, wherein the fiber further comprises at least one polymer different from polyethylene-2,5-furan-dicarboxylate.

21. Fiber according to any one of claims 13 to 20, which has been dyed by a dyeing technique, preferably selected from carrier or carrier free dyeing, high temperature and high pressure (HTHP) dyeing, thermosol dyeing, plasma techniques, solvent free, supercritical CO2-based dyeing, dyeing using swelling agents and combinations thereof.

22. Yarn, comprising a plurality of fibers according to any one of claims 13 to 21.

23. Knit, woven or non-woven article, comprising a yarn according to claim 22.

24.Article according to claim 23, which is selected from a textile, a carpet and a tire cord.