Claims

1. A method of preparing a polyolefin composite, the method comprising
blending a mixture consisting essentially of 50 to 94.9 weight percent (wt%) of high density polyethylene, 5 to 40 wt% of ultra-high molecular weight polyethylene; and 1 to 20 wt% of crosslinked polyethylene having a degree of crosslinking of 10% or less to provide a blended mixture, wherein the weight percent of each component is with respect to the polyolefin composite; and
forming the polyolefin composite from the blended mixture,
wherein the high density polyethylene has a number average molecular weight of at most 300,000, and the ultra-high molecular weight polyethylene has a number average molecular weight of at least 1,500,000.

2. The method according to claim 1, wherein the polyolefin composite comprises 3 to 15 wt% of the crosslinked polyethylene, preferably 5 to 10 wt% of the crosslinked polyethylene.

3. The method according to claim 1 or claim 2, wherein the polyolefin composite comprises 0.1 to 10 wt% of a nanofiller, preferably 0.2 to 5 wt% of the nanofiller, more preferably 0.5 to 2.5 wt% of the nanofiller.

4. The method according to any one of claims 1 to 3, wherein the number average molecular weight of the high density polyethylene is from 10,000 to 300,000.

5. The method according to any one of claims 1 to 4, wherein the number average molecular weight of the ultra-high molecular weight polyethylene is from 1,500,000 to 7,000,000.

6. The method according to any one of claims 1 to 5 comprising crosslinking polyethylene with a peroxide and/or an organosilane to form the crosslinked polyethylene.

7. The method according to claim 3, wherein the nanofiller is a rigid filler and selected from the group consisting of rod-liked glass, carbon, polymeric, metal oxides, metallic, and cellulose-based fibrous fillers, wherein the nanofiller has a particle size from 0.01 micrometre (μm) to 100 μm.

8. The method according to any one of claims 1 to 7 comprising adding a compatibilizer to the mixture, wherein the compatibilizer is a polymer with a grafted polar functional

group of an acid anhydride or an ester, preferably the polar functional group is selected from the group consisting of maleic anhydride, hydroxyl, carboxylic, carboxylate derivatives, citraconic anhydride, endo-bi-cyclo[2,2,1}-1,4,5,6,7,7-hexa-chloro-5-heptene-2,3-dicarboxylic acid anhydride, endo-bi cyclo[2,2,1]-5-heptene-2,3-dicarboxylic acid anhydride,cis-4-cyclohexene-1,2-dicarboxylic acid anhydride, methyl acrylate, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, maleate monoester and maleate diester, wherein the compatibilizer is 0.1 to 50 percentage by weight of the polyolefin composite.

9. The method according to any one of claims 1 to 8 comprising combining a plurality of batches of the blended mixture prior to forming the polyolefin composite.

10. A polyolefin composite consisting essentially of 50 to 94.9 wt% of high density polyethylene, 5 to 40 wt% of ultra-high molecular weight polyethylene, and 1 to 20 wt% of crosslinked polyethylene having a degree of crosslinking of 10% or less, wherein the high density polyethylene has a number average molecular weight of at most 300,000, the ultra-high molecular weight polyethylene has a number average molecular weight of at least 1,500,000.

11. The polyolefin composite according to claim 10, wherein the polyolefin composite comprises 3 to 15 wt%, of the crosslinked polyethylene, preferably 5 to 10 wt% of the crosslinked polyethylene.

12. The polyolefin composite according to claim 10 or claim 11, wherein the polyolefin composite comprises.1 to 10 wt% of a nanofiller, preferably 0.2 to 5 wt% of the nanofiller, more preferably 0.5 to 2.5 wt% of the nanofiller.

13. The polyolefin composite according to any one of claims 10 to 12, wherein the number average molecular weight of the high density polyethylene is from 10,000 to 300,000.

14. The polyolefin composite according to any one of claims 10 to 13, wherein the number average molecular weight of the ultra-high molecular weight polyethylene is from 1,500,000 to 7,000,000.

15. The polyolefin composite according to any one of claims 10 to 14. wherein the crosslinked polyethylene is crosslinked with a peroxide (preferably organic peroxide) and/or an organosilane.

16. The polyolefin composite according to claim 12, wherein the nanofiller is a rigid filler and selected from the group consisting of rod-liked glass, carbon, polymeric, metal oxides, metallic, and cellulose-based fibrous fillers, wherein the nanofiller has a particle size from 0.01 μm to 100 μm.

17. The polyolefin composite according to any one of claims 10 to 16 comprising a compatibilizer, wherein the compatibilizer is a polymer with a grafted polar functional group of an acid anhydride or an ester, preferably the polar functional group is selected from the group consisting of maleic anhydride, hydroxyl, carboxylic, carboxylate derivatives, citraconic anhydride, endo-bi-cyclo[2,2,1}-1,4,5,6,7,7-hexa-chloro-5-heptene-2,3-dicarboxylic acid anhydride, endo-bi cyclo[2,2,1]-5-heptene-2,3-dicarboxylic acid anhydride,cis-4-cyclohexene-1,2-dicarboxylic acid anhydride, methyl acrylate, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, maleate monoester and maleate diester, wherein the compatibilizer is 0.1 to 50 wt% of the polyolefin composite.

18. A rope or a sling comprising a polyolefin composite made according to any one of claims 1 to 9.

19. A rope or a sling comprising a polyolefin composite according to any one of claims 10 to 17.