CLAIMS

1. A kit comprising

- a first component comprising a first polyolefin and a polymerisable epoxide resin~~,~~ ~~wherein the first polyolefin is a major phase of the first component~~, and
- a second component comprising a second polyolefin and a catalytic agent, wherein the first polyolefin and the second polyolefin are present at more than 80wt% of the respective first component and second component.

2. The kit of claim 1, wherein the first polyolefin is present in the first component and/or the second polyolefin is present in the second component ~~at more than 80wt%, optionally~~ at more than 90wt% of the respective first component and the second component.

3. The kit of claim 1 or 2, wherein the first polyolefin and the second polyolefin are independently selected from the group consisting of a polymer or a random copolymer or a block copolymer of a C_{2-20}alkylene, a C_{4-20}alkyldiene, a C_{6-20}alkyltriene, a C_{3-20}cycloalkylene, a C_{4-20}cycloalkyldiene, a C_{5-20}cycloalkyltriene, a C_{8-20}phenylalkylene, and a combination thereof.

4. The kit of any one of the preceding claims, wherein the first polyolefin and the second polyolefin are independently selected from the group consisting of a polymer or a random or block copolymer of ethylene, propylene, 1-pentene, 1-butene, 4-methyl-1-pentene, 1-hexene, 1-octene, 1-decene, styrene, ethylidene norbornene, 1,4-hexadiene, 1,5-hexadiene, 1,7-octadiene, 1,9-decadiene, dicyclopentadiene and ethylene-propylene-diene monomer.

5. The kit of any one of the preceding claims, wherein the first polyolefin and/or the second polyolefin is polyethylene.

6. The kit of any one of claims 1 to 4, wherein the first polyolefin and/or the second polyolefin is polypropylene, optionally in a combination with an ethylene-α-olefin copolymer, the ethylene-α-olefin copolymer comprising a repeating unit derived from ethylene and a repeating unit derived from an α-olefin, optionally having 3 to 20 carbon atoms.

7. The kit of any one of the preceding claims, wherein the polymerisable epoxide resin is present at an amount greater or equal to 0.1 wt% and up to 50 wt%, optionally at an amount greater or equal to 0.1 wt% and less than 20 wt%, optionally at an amount greater or equal to 0.1 wt% and less than 15 wt%, optionally at an amount greater or equal to 5 wt% and less or equal to 15 wt%, optionally at an amount greater or equal to 0.1 wt% and less than 10 wt% based on the weight of the first component.

8. The kit of any one of the preceding claims, wherein the polymerisable epoxide resin is selected from the group consisting of an epoxy-containing monomer, an epoxy-containing oligomer, an epoxy-containing polymer and a combination thereof.

9. The kit of any one of claims 1 to 8, wherein the polymerisable epoxide resin is a glycidyl ether epoxy resin which is obtained by a reaction between an allylic phenyl derivative and an epoxide-containing precursor, wherein the allylic phenyl derivative is selected from the group consisting of ortho-allyl phenolic novolak and diallyl bisphenol compound having an allyl group in the *ortho* position of bisphenol A with respect to the hydroxyl group.

10. The kit of any one of claims 1 to 8, wherein the polymerisable epoxide resin is obtained by a reaction between a hydroxy derivative and an epoxide-containing precursor, wherein the hydroxy derivative is selected from the group consisting of bisphenol, resorcinol, dihydroxynaphthalene, trihydroxynaphthalene, dihydroxybiphenylfluorene, trishydroxylmethane, tetrakishydroxyphenylethane, novolak, phenol, and a combination thereof.

11. The kit of any one of claims 1 to 8, wherein the polymerisable epoxide resin is obtained by a reaction between an amine and an epoxide-containing precursor, wherein the amine is selected from the group consisting of tetraglycidyldiaminodiphenylmethane, aminophenol, aminocresol, xylenediamine, and a combination thereof.

12. The kit of any one of claims 1 to 8, wherein the polymerisable epoxide resin is obtained by a reaction between an aromatic carboxylic acid, an aliphatic carboxylic acid and/or an alicyclic carboxylic acid, and an epoxide-containing precursor.

13. The kit of any one of claims 9 to 12, wherein the epoxide-containing precursor is selected from the group consisting of epichlorohydrin, ethylene oxide, propylene oxide, styrene oxide, cyclohexene oxide, phenyl glycidyl ether, and a combination thereof.

14. The kit of any one of claims 1 to 8, wherein the polymerisable epoxide resin is selected from the group consisting of bisphenol A epoxy resin, bisphenol S epoxy resin, bisphenol K epoxy resin, bisphenol F epoxy resin, phenolic novolak epoxy resin, cresol novolak epoxy resin, acyclic epoxy resin, heterocyclic epoxy resin, hydrogenated bisphenol A epoxy resin, aliphatic epoxy resin, and a combination thereof.

15. The kit of claim 14, wherein the heterocyclic epoxy resin is selected from the group consisting of triglycidyl isocyanuric epoxy, hydantoin epoxy, and a combination thereof.

16. The kit of claim 14, wherein the aliphatic epoxy resin is selected from the group consisting of propylene glycol-diglycidyl ether, pentaerythritolpolyglycidyl ether, and a combination thereof.

17. The kit of any one of claims 1 to 8, wherein the polymerisable epoxide resin comprises a spiro ring.

18. The kit of any of the preceding claims, wherein the first component and/or the second component further comprises a polymer having a functional group grafted thereon.

19. The kit of claim 18, wherein the polymer having a functional group grafted thereon is a third polyolefin having a functional group grafted thereon.

20. The kit of claim 19, wherein the third polyolefin is selected from the group consisting of a polymer or a random copolymer or a block copolymer of a C_{2-20}alkylene, a C_{4-}

$_{20}$alkyldiene, a C_{6-20}alkyltriene, a C_{3-20}cycloalkylene, a C_{4-20}cycloalkyldiene, a C_{5-20}cycloalkyltriene, a C_{8-20}phenylalkylene, and a combination thereof.

21. The kit of claim 19 or 20, wherein the third polyolefin is selected from the group consisting of a polymer or a random or block copolymer of ethylene, propylene, 1-pentene, 1-butene, 4-methyl-1-pentene, 1-hexene, 1-octene, 1-decene, styrene, ethylidene norbornene, 1,4-hexadiene, 1,5-hexadiene, 1,7-octadiene, 1,9-decadiene, dicyclopentadiene and ethylene-propylene-diene monomer.

22. The kit of any one of claims 19 to 21, wherein the third polyolefin is polypropylene.

23. The kit of any one of claims 19 to 22, wherein the polymer having a functional group grafted thereon is a polymer comprising a –COO- group.

24. The kit of claim 23, wherein the polymer comprising the –COO-group is a polymer modified with an anhydride selected from the group consisting of maleic anhydride, succinic anhydride, 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, and a combination thereof.

25. The kit of claim 23 or 24, wherein the polymer comprising the –COO-group is a maleic anhydride-grafted polymer.

26. The kit of any one of claims 19 to 25, wherein the polymer having a functional group grafted thereon further comprises a moiety selected from the group consisting of a hydroxyl, a carboxylic acid, a carboxylate, methyl acrylate, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, maleate monoester, maleate diester, and a combination thereof.

27. The kit of any one of the preceding claims, wherein the catalytic agent is capable of initiating polymerization of the polymerisable epoxide resin.

28. The kit of any one of the preceding claims, wherein the catalytic agent is present at an amount greater or equal to 0.1 wt% and less than 30 wt%, optionally at an amount greater or equal to 0.1 wt% and less than 10 wt%, optionally at an amount greater or equal to 1 wt% and less than or equal to 10 wt%, based on the weight of the second component.

29. The kit of any one of the preceding claims, wherein the catalytic agent comprises an amine functionality which is capable of initiating polymerization of the polymerisable epoxide resin.

30. The kit of any one of the preceding claims, wherein the catalytic agent comprises a monoamine, a diamine, a triamine, a polyamine, an imidazole, a tertiary amine, a secondary amine, an organic acid hydrazide, or a combination thereof.

31. The kit of claim 30, wherein the catalytic agent further comprises an aliphatic component, an aromatic component, or a combination thereof.

32. The kit of any one of claims 1 to 28, wherein the catalytic agent comprises an anhydrous compound which is capable of initiating polymerization of the polymerisable epoxide resin.

33. The kit of claim 32, wherein the catalytic agent further comprises an aliphatic component, an aromatic component, or a combination thereof.

34. The kit of any one of claims 1 to 28, wherein the catalytic agent comprises a triaryl sulfonium salt, a dicyanamide, a boron trifluoride-amine complex, a polymercaptan, a polyamide resin, or a combination thereof.

35. The kit of any one of the preceding claims, wherein the first component and/or the second component further comprises an additive selected from the group consisting of an ultraviolet stabilizer, an antioxidant, a pigment and a combination thereof.

36. The kit of claim 35, wherein the ultraviolet stabilizer and/or the antioxidant is selected from the group consisting of a hindered phenol, phosphite, thioether, benzophenone, benzotriazole, and a combination thereof.

37. The kit of any one of the preceding claims, wherein the first component and/or the second component further comprises a styrene-based polymer.

38. The kit of claim 37, wherein the styrene-based polymer is selected from the group consisting of polystyrene, styrene-acrylonitrile resin, and a combination thereof.

39. A method of providing a polyolefin composite, the polyolefin composite comprising a first polyolefin, a polymerisable epoxide linker, and a second polyolefin, the method comprising mixing a first component comprising a first polyolefin and a polymerisable epoxide resin~~, wherein the first polyolefin is a major phase of the first component~~; and a second component comprising a second polyolefin and a catalytic agent, to form a mixture, wherein the first polyolefin and the second polyolefin is present at more than 80wt% of the respective first component and second component, and processing the mixture to obtain the polyolefin composite.

40. The method of claim 39, further comprising adding a filler to the mixture, optionally in an amount between ~~about~~ 1 wt% to ~~about~~ 80 wt%, optionally in an amount between ~~about~~ 10 wt% to ~~about~~ 60 wt%, based on the weight of the first component, the second component, or both the first component and the second component.

41. The method of claim 40, wherein the filler is selected from the group consisting of a microfiller, a continuous fiber, a highly dispersed nanofiller, and a combination thereof.

42. The method of claim 41, wherein a material of the microfiller is selected from the group consisting of metal, polymeric material, metal oxide, clay, glass, carbon, cellulose, and a combination thereof.

43. The method of claim 41 or 42, wherein the microfiller has a size of ~~about~~ 0.1 µm to ~~about~~ 50 mm, or of ~~about~~ 1 µm to ~~about~~ 50 mm, or of ~~about~~ 0.1 µm to ~~about~~ 20 mm, or of ~~about~~ 1 µm to ~~about~~ 20 mm, or of ~~about~~ 10 µm to ~~about~~ 50 mm.

44. The method of claim 41, wherein a material of the continuous fiber is selected from the group consisting of glass fiber, carbon fiber, hybrid fiber, synthetic fiber, natural fiber, ceramic fiber, metallic fiber, and a combination thereof.

45. The method of claim 41, wherein a material of the highly dispersed nanofiller is selected from the group consisting of inorganic silicate, alumino silicate, pellet-like metal oxide and hydroxide, anionic and cationic layered metal oxide and hydroxide, montmorillonite (MMT), kaolinite, dickite, halloysite, and nacrite, nontronite, beidellite, saponite, illite, biotite, lepidolite, phlogopite, clintonite, sepiolite, zinnwaldite, phengite, mica, layered metal oxide, layered metal hydroxide, attapulgite (AT), and a combination thereof.

46. The method of claim 45, wherein the inorganic silicate is calcium silicate.

47. The method of claim 41, wherein the highly dispersed nanofiller comprises metal oxide and/or metalloid oxide.

48. The method of claim 47, wherein the metal oxide and/or metalloid oxide is selected from the group consisting of SiO_2, TiO_2, ZnO, CaO, Al_2O_3, Fe_2O_3, and a combination thereof.

49. The method of any one of claims 41 to 48, wherein the highly dispersed nanofiller is modified with an organo silane.

50. The method of claim 49, wherein the organo silane comprises an active functional group selected from the group consisting of octyl, amine, vinyl, hydroxyl, thiol, and a combination thereof.

51. The method of any one of claims 39 to 50, further comprising adding a further polyolefin to the mixture, optionally in an amount greater or equal to 20 wt% and less than 99

wt%, optionally in an amount greater or equal to 40 wt% and less than 60 wt% based on the weight of the first component, the second component, or both the first component and the second component.

52. The method of any one of claims 39 to 51, further comprising adding a polymer having a functional group grafted thereon to the mixture, optionally in an amount greater or equal to 0.1 wt% and less than 20 wt%, optionally in an amount greater or equal to 1 wt% and less than 10 wt% based on the weight of the first component, the second component, or both the first component and the second component.

53. The method of any one of claims 39 to 52, wherein the mixing the first component and the second component is carried out in a mixer or a drum tumbler.

54. The method of any one of claims 39 to 53, wherein processing the mixture comprises physically agitating the mixture in a mixer, a roller, a twin extruder, or a combination thereof.

55. The method of any one of claims 39 to 54, wherein the first component and the second component are mixed in a wt% ratio from ~~about~~ 1:1 to ~~about~~ 5:1, or from ~~about~~ 1:1 to ~~about~~ 3:1.

56. The method of any one of claims 39 to 55, wherein processing comprises melt-mixing the mixture.

57. A polyolefin composite provided by the method of any one of claims 39 to 56.

58. A polyolefin composite comprising a first polyolefin, a polymerisable epoxide linker, and a second polyolefin provided by the kit of any one of claims 1 to 38.

59. The polyolefin composite of claim 57 or 58, wherein the first polyolefin, the second polyolefin and the further polyolefin, when present, are collectively present at ~~about~~ 40 wt% to ~~about~~ 99.9 wt% based on the total weight of the polyolefin composite.

60. The polyolefin composite of any one of claims 57 or 59, wherein the polymerisable epoxide linker is present at ~~about~~ 0.1 wt% to ~~about~~ 30 wt% based on the total weight of the polyolefin composite.

61. The polyolefin composite of any one of claims 57 to 60, wherein the additive, when present, is present at ~~about~~ 0.01 wt% to ~~about~~ 1 wt% based on the total weight of the polyolefin composite.

62. The polyolefin composite of any one of claims 57 to 61, wherein the polymer having a functional group grafted thereon, when added to the mixture, is present at ~~about~~ 0.1 wt% to ~~about~~ 50 wt% based on the total weight of the polyolefin composite.

63. The polyolefin composite of any one of claims 57 to 62, wherein the first component and the second component are present at ~~about~~ 0.1 wt% to ~~about~~ 20 wt% based on the total weight of the polyolefin composite.

64. The polyolefin composite of any one of claims 57 to 63, wherein the microfiller, when present, is present at ~~about~~ 1 wt% to ~~about~~ 70 wt% based on the total weight of the polyolefin composite.

65. The polyolefin composite of any one of claims 57 to 64, wherein the continuous fiber, when present, is present at ~~about~~ 1 wt% to ~~about~~ 80 wt% based on the total weight of the polyolefin composite.

66. Use of a polyolefin composite of any one of claims 57 to 65 in transportation, infrastructure, consumer goods, and/or construction.

67. The use of claim 66, wherein the transportation is selected from the group consisting of aerospace, automotive, train, and a combination thereof.

68. The use of claim 66, wherein the infrastructure is selected from the group consisting of pipe, tank, and a combination thereof.

69. The use of claim 66, wherein the consumer goods are selected from the group consisting of packaging, sporting goods, electronics, and a combination thereof.