

INDICATIVE CLAIMS:

1. **A method of manufacturing a plastic-containing emulsion** comprising
mixing a plastic source with a solvent in a mixing tank, the solvent selected from a non-reactive solvent or a reactive solvent,
the non-reactive solvent selected from an organohalide solvent, an aromatic hydrocarbon solvent, a mineral spirit, a dearomatised solvent or a combination thereof, and the reactive solvent selected from two or more monoethylenically unsaturated monomers, and
wherein if a non-reactive solvent is used, the plastic source comprises a further plastic that comprises a plastic selected from a styrene copolymer, a copolymer of an alkene and vinyl acetate, acrylic polymer and nylon based polymers or co-polymers, or combination thereof.
2. A method of claim 1 wherein the plastic source is dissolved in the solvent.
3. A method of claim 2 wherein the plastic source is
 - dissolved prior to its addition into the mixing tank, or
 - dissolved in the mixing tank.
4. A method of any one of claims 1 to 3 wherein the ratio of plastic source to solvent is between a ratio of 40:60 to 60:40.
5. A method of any one of claims 1 to 4 comprising adding an additive to the mixing tank, wherein the additive accounts for up to 20% of the composition, and is selected from the group consisting of paint, oil, marine waste plastic, propylene-based thermoplastic polymer, homo-polymer of ethylene, organic matter, and any combination thereof.
6. A method of any one of claims 1 to 5 wherein a particulate plastic, having a particle size of less than about 2 mm, is added to the mixing tank, the particulate plastic selected from PET, polypropylene or a polyethylene (including high and low density), or a combination thereof.
7. A method of any one of claims 1 to 6 wherein the particulate plastic accounts for about 15% to about 85% by weight of the total amount of plastic in the binder.
8. A method of claim 7 wherein the particulate plastic is selected from PET, polypropylene or a polyethylene (including high and low density).
9. A method of claim 7 or 8 wherein the particulate plastic has a particle size of less than about 2 mm.

10. A method of any one of claims 1 to 9 comprising a homogeniser in fluid communication with the mixing tank.
11. A method of any one of claims 1 to 10 comprising a solvent recovery system recover solvent from the binder formulation.
12. A method of claim 11 wherein the emulsion comprises less than 30% solvent.
13. A method of any one of claims 1 to 12 comprising combining the emulsion with a coarse aggregate to form a roading mixture, the coarse aggregate having a particle size of less than about 60 mm.
14. A method of claim 13 wherein the ratio of aggregate to binder is about 7 to about 12% binder to aggregate.
15. A method of any one of claims 1 to 14 wherein the roading mixture is absent any bitumen.
16. A method of claim 14 or 15 wherein the mixture is laid onto a roading base course at a thickness of between 50 to about 200 mm.
17. A method of claim 16 wherein the thickness of the road sub-base layer is 120 to 200 mm.
18. A method of claim 16 or 17 wherein the roading process includes a surface layer of plastic.
19. A method of claim 18 wherein the surface layer of plastic is formed from a plastic slurry comprising particulate PET having a particle size of less than 2 mm.
20. A method of claim 18 or 19 wherein the surface layer of plastic is about 50 to about 100 mm in thickness.
21. A method of any one of claims 1 to 20 wherein the plastic source comprises high melt plastic.
22. A method of claim 21 wherein the high melt plastic is selected from polyester-based thermoplastic polymer resin, propylene-based thermoplastic polymer, homo-polymer of ethylene is polyethylene, or a combination thereof.
23. A method of claim 21 or 22 wherein the composition is heated to about 100 to about 200 °C.

24. A method of any one of claims 22 to 23 wherein the high melt plastic is selected from ABS, nylon, EVA or acrylic, or a combination thereof.
25. A method of any one of claims 23 to 24 wherein the high melt plastic is selected from polyethylene, polypropylene, nylon, or a combination thereof.
26. **A method of manufacturing a plastic-composite product** comprising
- mixing a binder and a particulate or fibrous substrate to produce a mouldable mixture, the binder comprising a plastic source and a solvent, the binder comprising
 - i) a plastic source selected from polyester-based thermoplastic polymer resin, propylene-based thermoplastic polymer, a homo-polymer of ethylene, or a combination thereof, having a particle size of less than 8 mm, and water as a solvent,
 - ii) a plastic source comprising at least 30% by weight of total plastic of a plastic that contains a styrene unit and up to 70% by weight of total plastic of a plastic source selected from a styrene copolymer, a copolymer of ethylene and vinyl acetate, acrylic polymer and nylon based polymers or co-polymers, and a solvent selected from an organohalide solvent, an aromatic hydrocarbon solvent, a mineral spirit, a dearomatised solvent or a combination thereof, or
 - iii) a combination of (i) and (ii);
 - placing the mouldable mixture into a mould, and
 - compressing the mixture to produce the plastic-composite product.
27. A method of claim 26 wherein the plastic source has an average particle size of less than 8 mm.
28. A method of claim 26 or 27 wherein the particulate or fibrous substrate has a particle size of less than about 50 mm.
29. A method of any one of claims 26 to 28 wherein the particulate or fibrous substrate is selected from wood particles (e.g. sawdust or wood fibres or flakes), shredded paper or cardboard fibre, shredded polyethylene woven bags, shredded polyethylene bags, chipped PET bottles, crushed Glass, crushed consumables (e.g. crushed plastic toys, electronics, printer cartridges), volcanic ash and pot ash, granulated rubber, granulated tyres or a combination thereof.
30. A method of any one of claims 26 to 29 wherein the mould is heated to at least 100 °C.

31. A method of any one of claims 1 to 30 wherein the styrene copolymer is acrylonitrile butadiene styrene (ABS).
32. A method of any one of claims 1 to 31 wherein the copolymer of ethylene and vinyl acetate is ethylene-vinyl acetate (EVA).
33. A method of any one of claims 1 to 32 wherein the acrylic polymer is poly(methyl methacrylate).
34. A method of any one of claims 1 to 33 wherein the nylon based polymers or co-polymers is Nylon.
35. A method of any one of claims 1 to 34 wherein the polyester-based thermoplastic polymer resin is polyethylene terephthalate (PET).
36. A method of any one of claims 1 to 35 wherein the propylene-based thermoplastic polymer is polypropylene (PP).
37. A method of any one of claims 1 to 36 wherein the homo-polymer of ethylene is polyethylene (PE)(including high and low density polyethylene).
38. A method of any one of claims 1 to 37 wherein the organohalide solvent is selected from methyl chloride, methylene chloride or trichloroethylene, or a combination thereof.
39. A method of any one of claims 1 to 38 wherein the aromatic hydrocarbon solvent is selected from toluene or xylene, or a combination thereof.
40. A method of any one of claims 1 to 39 wherein the dearomatised solvent is selected from Exxsol™ D40, Exxsol™ D60, Exxsol™ D80 or Exxsol™ D100, ShellSol D60, or a combination thereof.
41. A composite product formed from the method of any one of claims 26 to 40.
42. A composite product of claim 41 wherein the composite product is a concrete-composite product, a wood-based composite product.
43. A composite product of claim 42 wherein the wood-based composite product is selected from plywood, particle board, and medium density board.
44. A method of any one of claims 42 to 43 wherein the composite product is a panel, post or block.

45. A method of manufacturing a road comprising providing a binder comprising,
- a plastic source comprising at least 30% by weight of total plastic of a plastic that comprises a styrene unit,
 - an acrylate monomer,
 - a cross-linker, and
- combining the binder with an aggregate to coat said aggregate, laying the mixture onto a roading base course at a thickness of between 50 to about 200 mm; and compacting the layer.
46. A method of claim 45 wherein the binder further comprises a styrene monomer.
47. A method of claim 45 or 46 wherein the binder further comprises a promotor.
48. A method of any one of claims 45 to 47 wherein the styrene monomer is polystyrene.
49. A method of any one of claims 45 to 48 wherein the acrylate monomer is selected from a soft monomer.
50. A method of any one of claims 45 to 48 wherein the acrylate monomer is selected from a hard monomer.
51. A method of any one of claims 45 to 50 wherein the plastic source is present at about 30 to about 50% by weight of the binder.
52. A method of any one of claims 45 to 51 wherein the binder comprises about 30 to about 70% by weight of a monomer.
53. A method of any one of claims 45 to 52 wherein the binder comprises about 5 to about 30% by weight of a cross-linker.
54. A method of any one of claims 45 to 53 wherein the binder comprises about 0.25 to 0.5% by weight of promotor.
55. A method of any one of claims 45 to 54 wherein the binder additional comprises a peroxide cross-linker.
56. A method of claim 55 wherein the peroxide cross-linker is present at about 2 to about 5% by weight of the binder.

57. A method of claim 55 or 56 wherein the peroxide cross-linker is selected from a benzoyl peroxide.

58. A method of any one of claims 45 to 57 wherein the binder is mixed with an aggregate, wherein the binder comprises about 8 to about 16% by weight of the total mixture.