

Claims

1. A polymer composition (PC1) in form of a polymer powder
5 comprising
a) one stage (A) comprising a polymer (A1) having a
glass transition temperature of less than 10°C,
b) one stage (B) comprising a polymer (B1) having a
glass transition temperature of at least 60°C, and
10 c) and a polymer (C1) having a glass transition
temperature of at least 30°C, said polymer (C1)
represents at most 40wt% of the composition based on
a), b) and c) only,
characterized in that at least the component a) and the
15 component b) of composition (PC1) are part of a multistage
polymer (MP1), and characterized in that the polymer (C1) has
a mass average molecular weight Mw between 10 000g/mol and
500 000g/mol and that the polymer composition (PC1) in form of
a polymer powder is having a total intruded volume of at least
20 1.2 ml/g as measured by mercury porosimetry.
2. The polymeric composition according to claim 1, characterized
in that the total intruded volume is at least 1.35 ml/g as
measured by mercury porosimetry.
- 25 3. The polymeric composition according to claim 1 or 2,
characterized in that the total intruded volume of at most
10ml/g as measured by mercury porosimetry.
- 30 4. The polymer composition (PC1) according to claim 1,
characterized in that the total intruded volume is between
1.2ml/g and 10ml/g, more preferably between 1.25ml/g and 8
ml/g, even more preferably between 1.3 ml/g and 7 ml/g,
advantageously between 1.35 ml/g and 6 ml/g, more
35 advantageously between 1.35 ml/g and 5ml/g and most
advantageously between 1.35 ml/g and 4ml/g.

5. The polymeric composition (PC1) according to any of claims 1 to 4, characterized in that the relative incremental intrusion of the polymer powder for a pore size above 10 μ m of at most 85%.
- 5 6. The polymer composition (PC1) according to claim 1 or 2 characterized in that the incremental intrusion of the polymer powder between a pore size from 10 μ m to 1 μ m is at least 0.1ml/g, more preferably at least 0.12ml/g and even more
10 preferably at least 0.15ml/g.
7. The polymer composition (PC1) according to claim 1 or 2 characterized in that the incremental intrusion of the polymer powder between a pore size from 10 μ m to 0.1 μ m of is at least
15 0.15ml/g, more preferably at least 0.2ml/g and even more preferably at least 0.25ml/g.
8. The polymeric composition according to claim 1 or 2 characterized in that the relative incremental intrusion
20 between a pore size from 10 μ m to 1 μ m of at least 5%, more preferably at least 8% and even more preferably at least 10%.
9. The polymer composition (PC1) according to any of claims 1 to 8, characterized in that the polymer powder has a volume
25 median particle size D50 between 1 μ m and 700 μ m.
10. The polymer composition (PC1) according to any of claims 1 to 8, characterized in that the apparent bulk density of the polymer powder is between 0.1g/cm³ and 0.60g/cm³.
30
11. The polymer composition according to any of claims 1 to 7, characterized in that the polymer composition (PC1) in form of a polymer powder of the invention or polymer powder composition POW1 comprises polymeric particles PAR that make
35 up at least 50wt% of the polymer composition (PC1) in form of a polymer powder composition or polymer powder composition POW1.

12. The polymer composition according to claim 11 characterized in that the polymeric particle PAR has a weight average particle size (diameter) between 15nm and 900nm.
- 5 13. The polymer composition according to any of claims 1 to 12, characterized in that the stage (A) is the first stage and that stage (B) comprising polymer (B1) is grafted on stage (A) comprising polymer (A1).
- 10 14. The polymer composition according to any of claims 1 to 13 characterized in that the polymers (B1) and (C1) are acrylic or (meth)acrylic polymers.
- 15 15. The polymer composition according to any of claims 1 to 14 characterized in that the polymer (A1) comprises butadiene as monomer.
- 20 16. The polymer composition according to any of claims 1 to 14 characterized in that the polymers (A1), (B1) and (C1) are acrylic or (meth)acrylic polymers.
- 25 17. The polymer composition according to any of claims 14 or 16 characterized that at least 80wt% the acrylic or methacrylic monomers of the polymers (A1), (B1) or (C1) are chosen from methyl acrylate, propyl acrylate, isopropyl acrylate, butyl acrylate, tert-butyl acrylate, methyl methacrylate, ethyl methacrylate, butyl methacrylate and mixtures thereof.
- 30 18. A process for manufacturing the polymer composition according to any of claims 1 to 17 comprising the steps of
- 35 a) polymerizing by emulsion polymerization of a monomer or monomer mixture (A_m) to obtain one layer in stage (A) comprising polymer (A1) having a glass transition temperature of less than 10°C
- b) polymerizing by emulsion polymerization of a monomer or monomer mixture (B_m) to obtain layer in stage (B)

- comprising a polymer (B1) having a glass transition temperature of at least 60°C
- c) polymerizing by emulsion polymerization of a monomer or monomer mixture (C_m) to obtain a layer in stage (C) comprising a polymer (C1) having a glass transition temperature of at least 30°C,
- d) coagulating the composition obtained in steps a) to c).
19. A process for manufacturing the polymer composition (PC1) according to any of claims 1 to 17 comprising the steps of
- a) polymerizing by emulsion polymerization of a monomer or monomer mixture (A_m) to obtain one layer in stage (A) comprising polymer (A1) having a glass transition temperature of less than 10°C,
- b) polymerizing by emulsion polymerization of a monomer or monomer mixture (B_m) to obtain layer in stage (B) comprising a polymer (B1) having a glass transition temperature of at least 60°C,
- both together steps a) and b) giving a multistage polymer (MP1) and step
- c) blending multistage polymer (MP1) with a polymer (C1) having a glass transition temperature of at least 30°C,
- d) coagulating the composition obtained in steps a) to c).
20. The process according to claim 18 or 19, characterized in that the step a) is made before step b).
21. The process according to any of claims 18 to 20, characterized in that the step b) is performed in presence of the polymer (A1) obtained in step a).
22. The process according to any of claims 18 to 19, characterized that the steps a), b), c) and d) are performed in that order.

23. The process according to any of claims 18 to 22, characterized in that the solid content before starting the coagulation is below 35wt%.
- 5 24. The process according to any of claims 18 to 22, characterized in that the solid content before starting the coagulation is below 32wt%.
- 10 25. The process according to any of claims 18 to 22, characterized in that the in the step d) the solid content before starting the coagulation is between 5wt% and 35wt%.
- 15 26. The process according to any of claims 18 to 22, characterized in that the in the step d) the solid content before starting the coagulation is between 20wt% and 35wt%.
- 20 27. The process according to any of claims 18 to 22, characterized in that the in the step d) the solid content before starting the coagulation is between 5wt% and 20wt%.
- 25 28. The process according to any of claims 18 to 22, characterized in that the in the step d) the solid content before starting the coagulation is between 10wt% and 25wt%.
- 30 29. The process according to any of claims 18 to 22, characterized in that the in the step d) the solid content before starting the coagulation is between 15wt% and 27wt%.
- 35 30. The process according to any of claims 18 to 29, characterized in that the in the step d) the coagulation is made with a salt or an inorganic acid.
31. The process according to any of claims 18 to 30, characterized that the process comprises additionally a drying step e).
32. Use of the polymer composition (PC1) according to any of claims 1 to 17 or obtained by the process according to any of claims 18 to 31 as impact modifier.

33. Use of the polymer composition (PC1) according to any of claims 1 to 17 as a reduced dispersing time composition.

5 34. A process to reduce the dispersing time of a polymer powder in a liquid composition by using the polymeric composition (PC1) according to any of claims 1 to 17.

35. The process according to claim 34, characterized in that the process is comprising the steps of

10

- providing a precursor for a thermosetting polymer or a monomer of a thermoplastic polymer
- bringing into contact the polymeric composition (PC1) and said precursor.

15

36. A process to reduce the time of dispersing a polymeric composition (PC1) in a liquid composition comprising the steps of:

- 20 a) providing a polymeric composition (PC1) in form of a porous polymer powder POW1 having total intruded volume of at least 1.2 ml/g as measured by mercury porosimetry,
- b) bringing into contact the polymeric composition with a liquid composition LC1.

25 37. The process according to claim 36, characterized in that the liquid composition LC1 is chosen from a compositions for preparing vinyl ester, unsaturated polyester or epoxy resin; or it can be for example a styrenic monomer or an (meth)arylic monomer, or a mixture thereof or a liquid composition comprising said monomers.

30

38. The process according to claim 36 or 37, characterized in that the the polymeric composition (PC1) represents between 0.5 and 50wt% of the composition comprising liquid composition LC1 and polymeric composition (PC1).

35

39. A polymer composition PC2 comprising the polymer composition (PC1) as impact modifier.