material for thermosetting polymers or thermoplastic polymers or its precursors.

[0030a] In an aspect, there is provided a polymer composition (PC1) 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

c) and a polymer (C1) having a glass transition temperature of at least 30°C

characterized in that at least the component a) and the 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 of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt% and more than 10 wt% of the composition based on a) b) and c).

[031] Surprisingly it has also been found that a method for manufacturing the polymer composition (PC1) 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

c) polymerizing by emulsion polymerization of a monomer or monomer mixture (Cm) to obtain a layer in a stage (C) comprising a polymer (C1) having a glass transition temperature of at least 30°C

characterized in that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and that the component c) represents at most 40wt% of the composition based on a), b) and c); yields to a polymer composition in form of polymer

particles that be easily dispersed in a polymeric matrix material for thermosetting polymers or thermoplastic polymers or its precursors.

[0031a] In another aspect, there is provided a method for manufacturing the polymer composition as defined above 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

c) polymerizing by emulsion polymerization of a monomer or monomer mixture (Cm) to obtain a layer in stage (C) comprising a polymer (C1) having a glass transition temperature of at least 30°C

characterized in that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt% and more than 10wt% of the composition based on a), b) and c).

[032] Surprisingly it has also been found that a method for manufacturing the polymer composition (PC1) 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 a 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

characterized in that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and that the component c) represents at most 40wt% of the composition obtained in steps a), b) and c); yields to a polymer composition in form of polymer particles that be easily dispersed in a polymeric matrix material for thermosetting polymers or thermoplastic polymers or its precursors.

[0032a] In another aspect, there is provided a method for manufacturing the polymer composition (PC1) as defined above 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

characterized that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt% and more than 10wt% of the composition obtained in steps a), b) and c).

[033] Surprisingly it has also been found that a polymeric composition (PC2) comprising

i) a polymer (P2) and

ii) a polymer composition (PC1) 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

c) and a polymer (C1) having a glass transition temperature of at least 30°C

characterized in that at least the component a) and the component b) of composition (PC1) are part of a multistage polymer (MP1), and characterized that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and that the component c) represents at most 40wt% of the composition based on a), b) and c); possesses satisfying impact properties.

[0033a] In another aspect, there is provided the use of the polymer composition as defined above or obtained by the method as defined above as an impact modifier.

[0033b] In another aspect, there is provided a polymer composition (PC2) comprising

i) a polymer (P2) and

ii) a polymer composition (PC1) comprising

a) one stage (A) comprising a polymer (A1) having a glass transition temperature of less then 10°C

b), one stage (B) comprising a polymer (B1) having a glass transition temperature of at least 60°C and

c) a polymer (C1) having a glass transition temperature of at least 30°C

characterized in that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt% and more than 10wt% of the composition based on a), b) and c).

[Detailed description of the invention]

[034] The present disclosure relates to a polymer composition (PC1) 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

Claims

1. A polymer composition (PC1) 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

   c) and a polymer (C1) having a glass transition temperature of at least 30°C

   characterized in that at least the component a) and the 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 of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt% and more than 10 wt% of the composition based on a) b) and c).

2. The polymer composition according to claim 1, characterized in that the polymer (C1) has a mass average molecular weight Mw between 110 000g/mol and 800 000g/mol.

3. The polymer composition according to claim 1, characterized in that the polymer (C1) has a mass average molecular weight Mw below 700 000g/mol.

4. The polymer composition according to claim 1, characterized in that the polymer (C1) has a mass average molecular weight Mw between 140 000g/mol and 500 000g/mol.

5. The polymer composition according to claim 1, characterized in that the component c) represents between 10wt% and 35wt% of the composition based on a,) b) and c).

6. The polymer composition according to claim 1, characterized in that the component c) represents advantageously less than 30wt% of the composition based on a,) b) and c).

7. The polymer composition according to claim 1, characterized in that the component c) represents between 10wt% and less than 20wt% of the composition based on a,) b) and c).

8. The polymer composition according to claim 1, characterized in that the component c) represents between 10wt% and less than 20wt% of the composition based on a,) b) and c) and that the polymer (C1) has a mass average molecular weight Mw below 700 000g/mol.

9. The polymer composition according to claim 1, characterized that the stage (A) is the first stage and that stage (B) comprising polymer (B1) is grafted on stage (A) comprising polymer (A1).

10. The polymer composition according to any of claims 1 to 9 characterized that the polymer (C1) is a (meth) acrylic polymer.

11. The polymer composition according to any of claims 1 to 10 characterized in that the polymer (C1) comprises at least 80wt% of monomers C1 to C4 alkyl methacrylate and/or C1 to C8 alkyl acrylate monomers.

12. The polymer composition according to any of claims 1 to 11 characterized in that the polymer (C1) comprises a functional comonomer.

13. The polymer composition according to claim 12 characterized in that the functional monomer is chosen from glycidyl (meth)acrylate, acrylic or methacrylic acid, the amides derived from these acids, such as, for example, dimethylacrylamide, 2-methoxyethyl acrylate or methacrylate, 2-aminoethyl acrylates or methacrylates are optionally quaternized, polyethylene glycol (meth) acrylates.

14. The polymer composition according to any of claims 1 to 9 characterized in that the polymer (B1) is crosslinked.

15. The polymer composition according to any of claims 1 to 9 characterized in that the polymers (B1) and (C1) are acrylic or methacrylic polymers.

16. The polymer composition according to any of claims 1 to 9 characterized that the polymer (A1) comprises butadiene as monomer.

17. The polymer composition according to any of claims 1 to 9 characterized that the polymers (A1), (B1) and (C1) are acrylic or methacrylic polymers.

18. The polymer composition according to claims 17, characterized that at least 80wt% the acrylic or methacrylic momonomers 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 there of.

19. A method for manufacturing the polymer composition according to any of claims 1 to 18 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

c) polymerizing by emulsion polymerization of a monomer or monomer mixture (Cm) to obtain a layer in stage (C) comprising a polymer (C1) having a glass transition temperature of at least 30°C

characterized in that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt% and more than 10wt% of the composition based on a), b) and c).

20. A method for manufacturing the polymer composition (PC1) according to any of claims 1 to 18 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

characterized that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt% and more than 10wt% of the composition obtained in steps a), b) and c).

21. The method according to claim 19 or 20, characterized in that the step a) is made before step b).

22. The method according to any of claims 19 to 20, characterized in that the step b) is performed in presence of the polymer (A1) obtained in step a).

23. The method according to any of claims 19 to 20, characterized that the steps a), b) and c) are performed in that order.

24. The method according to any of claims 19 to 23, characterized in that the method comprises an additional step d) recovering of the polymer composition.

25. The method according to claim 24, characterized in that step d) is made by coagulation or by spray-drying.

26. The method according to any of claims 19 to 23, characterized in that the polymer (C1) has a mass average molecular weight Mw between 110 000g/mol and 800 000g/mol.

27. The method according to any of claims 19 to 23, characterized in that the polymer (C1) has a mass average molecular weight Mw below 700 000g/mol.

28. The method according to any of claims 19 to 23, characterized in that the polymer (C1) has a mass average molecular weight Mw between 140 000g/mol and 500 000g/mol.

29. The method according to any of claims 19 to 23, characterized in that the component c) represents between 10wt% and less than 20wt% of the composition based on a,) b) and c).

30. The method according to any of claims 19 to 23, characterized in that the component c) represents between 10wt% and less than 20wt% of the composition based on a,) b) and c) and that the polymer (C1) has a mass average molecular weight Mw below 700 000g/mol.

31. Use of the polymer composition according to any of claims 1 to 18 or obtained by the method according to any of claims 19 to 30 as an impact modifier.

32. A polymer composition (PC2) comprising

i)a polymer (P2) and

ii)a polymer composition (PC1) comprising

a) one stage (A) comprising a polymer (A1) having a glass transition temperature of less then 10°C

b), one stage (B) comprising a polymer (B1) having a glass transition temperature of at least 60°C and

c) a polymer (C1) having a glass transition temperature of at least 30°C

characterized in that the polymer (C1) has a mass average molecular weight Mw of at least 100 000g/mol and below 800 000g/mol and that the component c) represents at most 40wt%

and more than 10wt% of the composition based on a), b) and c).

33. The polymer composition according to claim 32, characterized in that the polymer composition (PC1) is made according to the method of any of claims 20 to 31.

34. The polymer composition according to claims 32 or 33, characterized in that the polymer (P2) is thermoset polymer or its precursor, or a thermoplastic polymer or a structural adhesive.

35. The polymer composition according to claims 32 or 33, characterized in that the polymer (C1) has a mass average molecular weight Mw between 110 000g/mol and 800 000g/mol.

36. The polymer composition according to claims 32 or 33, characterized in that the polymer (C1) has a mass average molecular weight Mw below 700 000g/mol.

37. The polymer composition according to claims 32 or 33, characterized in that the polymer (C1) has a mass average molecular weight Mw between 140 000g/mol and 500 000g/mol.

38. The polymer composition according to claims 32 or 33, characterized in that the component c) represents between 10wt% and less than 20wt% of the composition based on a,) b) and c).

39. The polymer composition according to claims 32 or 33, characterized in that the component c) represents between 10wt% and less than 20wt% of the composition based on a,) b) and c) and that that the polymer (C1) has a mass average molecular weight Mw below 700 000g/mol.