matrix material for thermoset polymers are unsaturated polyesters, vinylesters, epoxy or phenolic ones.

[008] Thermosetting resins once cured have excellent properties in view of dimensional stability, mechanical strength, electrical insulating properties, heat resistance, water resistance and chemical resistance. Such thermosetting resins are for example epoxy resins or phenolic resins. However such cured resins have small fracture toughness and are brittle.

[009] In order to guarantee and obtain a satisfying mechanical performance over a large temperature range, the impact performance of the thermoset polymer matrix has to be increased.

[010] One form of impact modifiers are core-shell particles also called multistage polymers which are made by a multistage process, with at least stage comprising a rubber like polymer. Afterwards the particles are incorporated in the brittle polymer for composite material or the one of the phases for the structural adhesives, in order to increase the impact resistance of the finished product.

[011] However these kind of multistage polymers are not easy to disperse in all kind of resins or polymers or even monomers, especially in a homogeneous distribution and/or in small or large quantities at a reasonable time; for example in curable resins as unsaturated polyesters or vinylesters, but also other precursors of polymeric phases or monomers for composites and structural adhesives.

[012] A good homogeneous dispersion of the multistage polymer is necessary for having satisfying impact performance. The dispersion should also have a reasonable stability (pot life).

[013] The objective of the present disclosure is to propose a composition suitable for preparing cured toughened thermoset polymers comprising a multistage polymer and a thermoplastic polymer, which is homogeneous and stable, while having a suitable viscosity for the required application.

[014] An additional objective of the present disclosure is also to provide a composition suitable for preparing cured thermoset polymers comprising a precursor of the thermoset polymer, a

multistage polymer and a thermoplastic polymer, which can be easily and fast prepared.

[015] Another objective of the present disclosure is to propose a method for manufacturing a composition suitable for preparing cured thermoset polymers comprising a precursor of the thermoset polymer, a multistage polymer and a thermoplastic polymer, which is homogeneous and stable, while having a suitable viscosity for the required application.

[016] Still another objective of the present disclosure is a method for manufacturing a cured toughened polymer composition with satisfying impact properties.

[017] The objective of the present disclosure is to propose a process with reduced preparation time of a composition suitable for preparing cured thermoset polymers comprising a multistage polymer.

[018] Still an additional objective is to propose an impact modified cured polymer with satisfying impact properties or adhesive composition, with satisfying impact and adhesive strength properties.

[BACKGROUND OF THE INVENTION]Prior art

[019] The document WO2016/102666 discloses a composition comprising a multistage polymer and its method of preparation. The composition comprises as well a (meth) acrylic polymer that has a mass average molecular weight of less than 100 000g/mol.

[020] The document WO2016/102682 discloses a multistage polymer composition and its method of preparation. The multistage polymer comprises a last stage that comprises a (meth) acrylic polymer that has a mass average molecular weight of less than 100 000g/mol.

[021] The document EP2441784A1 discloses a vinyl ester composition that contains polymer fine particles. The polymer fine particles are core shell polymers with a shell comprising aromatic vinyl monomers and vinyl cyan monomer.

[022] The document EP 1 632 533 describes a process for producing modified epoxy resin. The epoxy resin composition is having rubber like polymer particles dispersed in it by a process that brings

the particles in contact with an organic medium that disperses the rubber particles.

[023] The document WO2019/011984 discloses a resin composition. The resin composition comprises a resin system, a curative system and a particle system. The particle system is a multistage polymer.

[024] None of the prior art documents discloses a composition or a process as claimed.

[Brief description]

[024a] In an aspect, there is provided a composition (PC1) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (A1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (A2) comprising a polymer (A1) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and

c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2)

characterized in that the polymer (B1) has a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol and that the component b) represents at most 40wt% of a composition based on a), and b) only and the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c).

[024b] In another aspect, there is provided a method for manufacturing a composition (PC1) as defined above comprising the steps of

i) providing a composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (A1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (A2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b);

and

ii) mixing the composition (Ci) with a composition (Ciia) comprising at least one other component or compound present in the composition (PC1); and

iii) optionally mixing the composition obtained in step ii) with the other components or compounds present in the composition (PC1) that have not been added yet in step ii).

[024c] In another aspect, there is provided a method for manufacturing the composition (PC1) as defined above comprising the steps of

i) providing a polymeric composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (A1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (A2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b),

ii) providing a composition (Ciib) comprising c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2),

iii) mixing the compositions (Ci) and (Ciib) comprising the components a), b) and c) in a ratio that the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c).

[024d] In another aspect, there is provided a method for reducing the preparation time of a composition (PC1) comprising the steps of

i) providing a polymeric composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (A1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (A2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b),

ii) providing a composition (Ciib) comprising c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2),

iii) mixing the compositions (Ci) and (Ciib) comprising the components a), b) and c) in a ratio so that the sum of components a) and b) is between 0.5 and 100phr for 100phr of component c).

[024e] In another aspect, there is provided a method for manufacturing the composition (PC1) as defined above comprising the steps of

i) providing a polymeric composition comprising

a) a multistage polymer (MP1) comprising

a1) one stage (A1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (A2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C,

ii) providing c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2),

iii) mixing the components a), b) and c).

[024f] In another aspect, there is provided the use of the composition as defined above or obtained by the method as defined above to prepare an impact modified polymeric composition (PC2).

[024g] In another aspect, there is provided a polymeric composition (PC2) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (A1) comprising a polymer (A1) having a glass transition temperature of less than 10°C,

a2) one stage (A2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and

c) a polymer (P2) comprising units from a compound (C1) with at least two polymerizable groups (PG1) and (PG2),

characterized in that the polymer (B1) has a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol and that the component b) represents at most 40wt% of a composition based on a), and b) only and the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c).

[024h] In another aspect, there is provided the use of the polymeric composition (PC2) as defined above as an adhesive and more preferably a structural adhesive or in a polymeric composite; or in applications as coating, decorative casting, flooring, polymer concrete, solid surfaces, artificial marble, or in marine applications, building and construction, wind energy applications.

[025] Surprisingly it has been found that a composition (PC1) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and

c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2),

characterized in that the polymer (B1) has a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol and that the component b) represents at most 40wt% of a composition based on a) and b) only and the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c);

can be easily dispersed in the precursors for a polymeric matrix material for thermosetting polymers.

[026] Surprisingly it has also been found that a composition (PC1) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and