Summary

TAccordingly, in a first aspect, there is provided an aqueous dispersible polymer composition comprising:

(a) at least one of: (i) a dendritic polymer in admixture with a hydrophilic functionalizing agent; and (ii) a hydrophilic functionalized dendrimer; and

(b) a non-dendritic polymer capable of forming bonds with said dendritic polymer to thereby form a dendrimer-non-dendrimer (DND) polymer hybrid that is dispersible in the aqueous phase and said non-dendritic polymer being selected to enable said DND polymer hybrid to exhibit superior film forming properties in said aqueous phase relative to a functionalized dendritic polymer.

In a first aspect, there is provided an aqueous dispersible polymer composition comprising:

(a) at least one of:

(i) a hydroxyl terminated dendritic polymer having a theoretical peripheral functionality of at least 32, in admixture with a hydrophilic functionalizing agent; and

(ii) a hydroxyl functional dendritic polymer having theoretical peripheral functionality of at least 32 wherein at least 5% of its peripheral hydroxyl groups have been functionalized by a hydrophilic group; and

(b) a non-dendritic polymer capable of forming bonds with said dendritic polymer to thereby form a dendrimer-non-dendrimer (DND) polymer hybrid that is dispersible in the aqueous phase, and said non-dendritic polymer being selected from the group consisting of: polyester, polyacrylate, polyurethane, polyurethane dispersion (PUD), polyester polyol, polyurethane polyol, polyacrylate polyol, polycarbonate, polycarbonate polyol, copolymers and blends thereof.

In one embodiment, the aqueous dispersible polymer composition comprises a dendritic polymer in admixture with the hydrophilic functionalizing agent, the functionalizing agent being substantially prevented from reacting with the dendritic polymer.

In another embodiment, the aqueous dispersible polymer composition comprises a dendrimer that has already been functionalized with the hydrophilic functionalizing agent, wherein the peripheral functional groups of the dendrimer are at least partially substituted by the hydrophilic groups of the functionalizing agent.

Advantageously, the non-dendritic polymer can be selected such that the DND polymer hybrid is capable of forming an aqueous dispersible polymer composition that exhibits superior film forming properties when compared to conventional water-dispersible compositions comprising only a functionalized dendritic polymer. In particular, it has been found that an aqueous dispersible polymer

coating. Such additives include, but are not limited to, surfactants, ultra-violet (UV) absorbers, and nanoparticles.

Furthermore, the large DND polymer hybrid molecule may also have a greater molecular interstitial volume which may be useful for accommodating additives compounds within the bulk polymer phase and cause them to be evenly distributed throughout the DND polymer. This is useful for imparting desired physical / chemical properties to the aqueous dispersible polymer composition while at the same time ensuring that the homogeneity of the composition is maintained.

T~~In a second aspect, t~~here is also provided a process for preparing an aqueous dispersible polymer composition, said process comprising the steps of:(a) providing at least one of:(i) a dendritic polymer; and (ii) a hydrophilic functionalized dendrimer; and either one of steps: (b1) mixing said (i) dendritic polymer with a non-dendritic polymer in the presence of a cross-linker, followed by reaction with a hydrophilic functionalizing agent; or (b2) mixing said (ii) hydrophilic functionalized dendrimer with a non-dendritic polymer, to thereby form a dendrimer-non-dendrimer (DND) polymer hybrid that is dispersible in an aqueous medium, said non-dendritic polymer being selected to enable said DND polymer hybrid to exhibit superior film forming properties in said aqueous medium relative to a functionalized dendritic polymer.

In a second aspect, there is provided a process for preparing an aqueous dispersible polymer composition, said process comprising the steps of:

(a) providing at least one of:

(i) a hydroxyl terminated dendritic polymer; having at least 32 theoretical peripheral hydroxyl groups and;

(ii) a hydroxyl functional dendritic polymer having a theoretical peripheral functionality of at least 32 wherein at least 5% of its peripheral hydroxyl groups have been functionalized by a hydrophilic group; and either one of steps:

(b1) mixing said (i) hydroxyl terminated dendritic polymer with a non-dendritic polymer in the presence of a cross-linker, followed by reaction with a hydrophilic functionalizing agent; or

(b2) mixing said (ii) hydrophilic functionalized dendritic polymer with a non-dendritic polymer,

to thereby form a dendrimer-non-dendrimer (DND) polymer hybrid that is dispersible in an aqueous medium, and said non-dendritic polymer being selected from the group consisting of: polyester, polyacrylate, polyurethane, polyester polyol, polyurethane, PUD, polyol, polyacrylate polyol, polycarbonate, polycarbonate polyol, copolymers and blends thereof.

In a third aspect, there is provided the use of the aqueous dispersible polymer composition as defined above or an aqueous dispersible polymer composition produced according to the process defined above, for forming a protective coating over a surface.

In a fourth aspect, there is provided an article coated by the coating as defined in the third aspect.

In a fifth aspect, there is provided an aqueous dispersible coating composition comprising:

a first component comprising an aqueous dispersible polymer composition as defined above or an aqueous dispersible polymer composition produced according to the process as defined above; and

a second component comprising a cross-linker, wherein the first and second components are mixed together to form the coating composition.

Definitions

The following words and terms used herein shall have the meaning indicated:

In the context of the present specification, the term "aqueous dispersible polymer composition" is to be used interchangeably with the terms "water-based polymer composition" and/or "water-borne polymer composition" and is taken to refer to a polymer composition that is either substantially or completely miscible or dispersible in an aqueous medium such as water.

The word "substantially" does not exclude "completely" e.g. a composition which is "substantially free" from Y may be completely free from Y. Where necessary, the word "substantially" may be omitted from the definition of the invention.

Unless specified otherwise, the terms "comprising" and "comprise", and grammatical variants thereof, are intended to represent "open" or "inclusive" language such that they include recited elements but also permit inclusion of additional, unrecited elements.

As used herein, the term "about", in the context of concentrations of components of the formulations, typically means +/- 5% of the stated value, more typically +/- 4% of the stated value, more typically +/- 3% of the stated value, more typically, +/- 2% of the stated value, even more typically +/- 1% of the stated value, and even more typically +/- 0.5% of the stated value.

Throughout this disclosure, certain embodiments may be disclosed in a range format. It should be understood that the description in range format is merely for