In one embodiment, the instant invention provides a composition comprising: a blended product of: a matrix polymer; and from 0.05 to 2.5 wt% diffuser polymer particles, wherein the diffuser polymer particles are characterized by an average diameter from 2 to 20 micrometers, a particle size distribution such that at least 90 wt% of the polymer particles fall within ±30% of the volume average particle size, a crosslinking level greater than 4wt%; and wherein the diffuser polymer particles comprise units derived from at least one alkyl (meth)acrylate monomer, from 5 wt % to 25 wt % units derived from a crosslinking monomer selected from the group consisting of aliphatic crosslinking monomers, aromatic crosslinking monomers and combinations thereof, optionally, units derived from one or more comonomers selected from the group consisting of aryl (meth)acrylate monomers and monovinyl arenes; and wherein from 0.1 to 20 wt% one or more performance additives are dispersed within the diffuser polymer particles.

In an aspect, there is provided a light diffusing composition comprising: a blended product of: a matrix polymer; and from 0.05 to 2.5 wt% diffuser polymer particles, wherein the diffuser polymer particles are characterized by an average diameter from 2 to 20 micrometers, a particle size distribution such that at least 90 wt % of the polymer particles fall within ±30% of the volume average particle size, a crosslinking level greater than 4%, a refractive index, R1, from 1.40 to 1.70; and wherein the diffuser polymer particles comprise units derived from at least one alkyl (meth)acrylate monomer, from 5 wt % to 25 wt % units derived from a crosslinking monomer selected from the group consisting of aliphatic crosslinking monomers, aromatic crosslinking monomers and combinations thereof, optionally, units derived from one or more comonomers selected from the group consisting of aryl (meth)acrylate monomers and monovinyl arenes; and wherein from 0.1 to 20 wt% one or more performance additives selected from the group consisting of refractive index changing agents, dyes, pigments, TiO_2 and flame retardants, are dispersed within the diffuser polymer particles based on the total weight of the diffuser particle, including the performance additive.

Detailed Description of the Invention

The instant invention is a light diffusing polymer composition, method of producing the same, articles made therefrom, and methods for making such articles.

The light diffusing composition according to the present invention comprises: a blended product of: a matrix polymer; and from 0.05 to 2.5 wt% diffuser polymer particles, wherein the

diffuser polymer particles are characterized by an average diameter from 2 to 20 micrometers, a particle size distribution such that at least 90 wt % of the polymer particles fall within ±30% of the volume average particle size, a crosslinking level greater than 4wt%; and wherein the diffuser polymer particles comprise units derived from at least one alkyl (meth)acrylate monomer, from 5 wt % to 25 wt % units derived from a crosslinking monomer selected from the group consisting of aliphatic crosslinking monomers, aromatic crosslinking monomers and combinations thereof, optionally, units derived from one or more comonomers selected from the group consisting of aryl (meth)acrylate monomers and monovinyl arenes; and wherein from 0.1 to 20 wt% one or more performance additives are dispersed within the diffuser polymer particles.

The terms "μ," "μm," and "micrometers" are used synonymously herein.

As used herein, the term (meth)acrylate means acrylate, methacrylate, or combinations of acrylate and methacrylate. For example, the term methyl (meth)acrylate may mean solely methyl methacrylate, solely methyl acrylate or a combination of methyl methacrylate and methyl acrylate.

As used herein, the term "performance additive" means non polymerizable materials that are dissolved or dispersed in the monomer prior to polymerization to form, after polymerization, a

We Claim:

1. A light diffusing composition comprising:

a blended product of:

a matrix polymer; and

from 0.05 to 2.5 wt% diffuser polymer particles,

wherein the diffuser polymer particles are characterized by an average diameter from 2 to 20 micrometers, a particle size distribution such that at least 90 wt % of the polymer particles fall within ±30% of the volume average particle size, a crosslinking level greater than 4%, a refractive index, R1, from 1.40 to 1.70; and

wherein the diffuser polymer particles comprise units derived from at least one alkyl (meth)acrylate monomer, from 5 wt % to 25 wt % units derived from a crosslinking monomer selected from the group consisting of aliphatic crosslinking monomers, aromatic crosslinking monomers and combinations thereof, optionally, units derived from one or more comonomers selected from the group consisting of aryl (meth)acrylate monomers and monovinyl arenes; and

wherein from 0.1 to 20 wt% one or more performance additives selected from the group consisting of refractive index changing agents, dyes, pigments, TiO_2 and flame retardants, are dispersed within the diffuser polymer particles based on the total weight of the diffuser particle, including the performance additive.

2. The composition according to claim 1, wherein the matrix polymer is selected from the group consisting of polycarbonates, polymethylmethacrylate, polystyrene, styrene-acrylonitrile copolymers, polystyrene methacrylate copolymers, styrene-methyl methacrylate copolymers, olefin-vinyl acetate copolymers, polymethylpentene, polyethylene, polypropylene, copolymers of polyethylene and polypropylene, polyglutarimide, styrene-maleic anhydride copolymers, cyclic olefin copolymers, polyesters, polyethylene terephthalate and combinations thereof.

3. The composition according to any one of the preceding claims, wherein the performance additive is a refractive index changing agent.

4. The composition according to any one of the preceding claims, wherein the performance additive is a refractive index changing agent that changes the refractive index by greater than 0.01 units.

5. The composition according to any one of the preceding claims, wherein the performance additive is a pigment.

6. The composition according to any one of the preceding claims, wherein the performance additive is one or more flame retardants.

7. The composition according to claim 6, wherein the one or more flame retardants are non-halogenated.

8. The composition according to claim 6, wherein the one or more flame retardants are selected from the group consisting of bromine-containing acrylic resins (such as, brominated polybenzyl(meth)acrylate resin), bromine-containing styrene resins (such as, bromination product of a styrene resin, brominated styrene resin such as a homo- or co-polymer of brominated styrene monomers), bromine-containing polycarbonate resins (such as, brominated bisphenol-type polycarbonate resin), bromine-containing epoxy compound (such as, brominated bisphenol-type epoxy resin, brominated bisphenol-type phenoxy resin), brominated polyaryl ether compounds, brominated aromatic imide compounds (such as, alkylene-bis-brominated phthalimide), brominated bisaryl compounds, brominated tri(aryloxy)triazine compounds, and combinations thereof.

9. The composition according to claim 8, wherein the matrix polymer comprises polycarbonate and wherein a plaque tested according to ASTM D2863-12 exhibits an LOI of at least 24%.

10. The composition according to any one of the preceding claims, wherein the diffuser polymer particles comprise from 50 to 90 wt% units derived from at least one alkyl (meth)acrylate monomer, from 5 to 25 wt% units derived from one or more aryl (meth)acrylate comonomers, and from 5 to 25 wt% units derived from crosslinking monomer selected from the group consisting of aliphatic crosslinking monomers, aromatic crosslinking monomers and combinations thereof.

11. The composition according to any one of the preceding claims, wherein the crosslinking monomer is divinylbenzene.

12. The composition according to any one of the preceding claims, wherein the at least one alkyl (meth)acrylate monomer is methyl methacrylate.

13. The composition according to any one of the preceding claims, wherein the composition comprises an amount of pigment dispersed in the diffuser particles and exhibits a ΔE of at least 0.5 when compared with a comparative composition having identical components as the composition except that the same amount of the pigment is dispersed in the matrix polymer and not in the diffuser particles.

14. The composition according to any one of the preceding claims, wherein the composition comprises an amount of TiO_2 in the diffuser particles which exhibits an increase of at least 50% in D50

angle in comparison to a comparative composition having identical components as the composition except that the same amount of the TiO_2 is dispersed in the matrix polymer and not in the diffuser particles.