HIGH JETNESS CARBON BLACK COMPOSITIONS

BACKGROUND

TECHNICAL FIELD

[0001] The present disclosure relates to carbon black and compositions comprising carbon black that can be useful in applications requiring high-jetness. The disclosure provides compositions useful in high-jetness applications and method for the preparation and use thereof.

TECHNICAL BACKGROUND

[0002] Carbon blacks can be utilized in a variety of applications to impart color. The ability of a carbon black material or a composition comprising such a carbon black material to absorb light is referred to as jetness. Frequently, jetness refers to the color of a material containing carbon black as the only pigment, whereas tint can refer to the color developed by using blends of pigments. Higher jetness carbon blacks can result in darker compositions than low jetness carbon black materials. Spectrophotomers can be used to evaluate the jetness of a sample.

[0003] High jetness carbon blacks can also be difficult to disperse in some systems. Thus, there is a need for improved high jetness carbon blacks and compositions comprising such high jetness carbon blacks. These needs and other needs are satisfied by the compositions and methods of the present disclosure.

SUMMARY

[0003a] In one aspect, provided herein is a masterbead composition consisting of from 50 wt.% to 80 wt.% of a carbon nanomaterial, and from 20 wt.% to 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant.

[0003b] In another aspect, provided herein is a method for preparing a masterbead composition as described herein, the method comprising contacting from 50 wt.% to 80 wt.% of a carbon nanomaterial, and from 20 wt.% to 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or

antioxidant, and a flame retardant, to form a masterbead having a plurality of finely divided particles.

[0004] In accordance with the purpose(s) of the disclosure, as embodied and broadly described herein, this disclosure, in one example, relates to high jetness carbon black materials, to compositions comprising such high jetness carbon black materials, and methods for the preparation and use thereof.

[0005] In one example, the present disclosure provides a masterbead composition comprising from about 50 wt.% to about 80 wt.% of a carbon nanomaterial, and from about 20 wt.% to about 50 wt.% of an additive comprising one or more of the

following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant.

[0006] In another example, the present disclosure provides a masterbead composition comprising from about 50 wt.% to about 80 wt.% of a carbon black, and from about 20 wt.% to about 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant.

[0007] In another example, the present disclosure provides a masterbead composition comprising from about 50 wt.% to about 80 wt.% of a piano black, and from about 20 wt.% to about 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant.

[0008] In another example, the present disclosure provides a masterbead composition comprising from about 50 wt.% to about 80 wt.% of a carbon nanomaterial, and from about 20 wt.% to about 50 wt.% of an additive comprising a mold release composition.

[0009] In another example, the present disclosure provides a masterbead composition comprising from about 50 wt.% to about 80 wt.% of a carbon nanomaterial, and from about 20 wt.% to about 50 wt.% of an additive comprising an amide.

[0010] In another example, the present disclosure provides a masterbead composition comprising from about 50 wt.% to about 80 wt.% of a carbon nanomaterial, and from about 20 wt.% to about 50 wt.% of an additive comprising N,N’-ethylene bis(stearamide).

[0011] In one example, the present disclosure provides a masterbead composition comprising from about 50 wt.% to about 80 wt.% of a carbon nanomaterial, and from about 20 wt.% to about 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant, wherein when the masterbead composition is let-down to a carbon black loading of from about 0.5 wt.% to about 1.0 wt.% in a resin, has a jetness (L value) of less than about 3.5.

[0012] In another example, the present disclosure provides a method for preparing a masterbead composition, the method comprising contacting from about 50 wt.% to about 80 wt.% of a carbon nanomaterial, and from about 20 wt.% to about 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant, to form a masterbead having a plurality of finely divided particles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The accompanying figures, which are incorporated in and constitute a part of this specification, illustrate several aspects and together with the description serve to explain the principles of the invention.

[0014] Figure 1A is a scanning electron microscopy (SEM) image of a cross section of masterbatch extrudate prepared using 30 wt.% Raven 2500 Ultra carbon black in polyamide 6 resin, in accordance with various aspects of the present disclosure.

[0015] Figure 1B is an SEM image of a cross section of masterbatch extrudate prepared using 20 wt.% Raven 5100 Ultra carbon black in polyamide 6 resin, in accordance with various aspects of the present disclosure.

[0016] Figure 1C is an SEM image of a cross section of masterbatch extrudate prepared using 20 wt.% Raven 5100 Ultra carbon black and 10 wt.% N,N'-ethylene bis(stearamide) (EBS) in polyamide 6 resin, in accordance with various aspects of the present disclosure.

[0017] Figure 2A is a transmission electron microscope (TEM) image of a portion of an injection molded color chip, prepared from a masterbead composition of Raven 2500 Ultra carbon black and EBS, let down to a carbon black loading of 0.5 wt.% using polyamide 6, in accordance with various aspects of the present disclosure.

[0018] Figure 2B is a TEM image of a portion of an injection molded color chip, prepared from a masterbead composition of Raven 3000 Ultra carbon black and EBS, let down to a carbon black loading of 0.5 wt.% using polyamide 6, in accordance with various aspects of the present disclosure.

CLAIMS

What is claimed is:

1. A masterbead composition consisting of from 50 wt.% to 80 wt.% of a carbon nanomaterial, and from 20 wt.% to 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant.
2. The masterbead composition of claim 1, wherein the carbon nanomaterial comprises at least 60 wt.% of the composition.
3. The masterbead composition of claim 1, wherein the carbon nanomaterial comprises at least 70 wt.% of the composition.
4. The masterbead composition of claim 1, wherein the carbon nanomaterial comprises at least 75 wt.% of the composition.
5. The masterbead composition of claim 1, wherein the carbon nanomaterial comprises a carbon black.
6. The masterbead composition of claim 5, wherein the carbon black comprises a furnace carbon black.
7. The masterbead composition of claim 5, wherein the carbon black is oxidized.
8. The masterbead composition of claim 5, wherein the carbon black comprises a piano black.
9. The masterbead composition of claim 1, wherein the carbon nanomaterial comprises a carbon nanotube.
10. The masterbead composition of claim 1, wherein the additive comprises an amide.
11. The masterbead composition of claim 1, wherein the additive comprises N,N’-ethylene bis(stearamide).
12. The masterbead composition of claim 1, wherein the additive comprises a wax.
13. The masterbead composition of claim 1, wherein the composition does not comprise a wax.
14. The masterbead composition of claim 1, wherein the composition does not

comprise a resin.

15. The masterbead composition of claim 1, consisting essentially of carbon black and an amide.

16. The masterbead composition of claim 1, which when let-down to a carbon black loading of from 0.5 wt.% to 1.0 wt.% in a resin, has a jetness (L value) of less than 3.5

17. The masterbead composition of claim 16, wherein the resin comprises a polyamide resin.

18. The masterbead composition of claim 16, having a jetness (L value) of less than 3.

19. A method for preparing a masterbead composition according to claim 1, the method comprising contacting from 50 wt.% to 80 wt.% of a carbon nanomaterial, and from 20 wt.% to 50 wt.% of an additive comprising one or more of the following: a mold release composition, a UV stabilizer, a heat stabilizer and/or antioxidant, and a flame retardant, to form a masterbead having a plurality of finely divided particles.

20. The method of claim 19, wherein the carbon nanomaterial comprises a carbon black.