CLAIMS

1. A method of forming a polyhydroxyalkanoate (PHA) copolymer, comprising:

generating a copolymer of PHA as a slurry or broth after cell fermentation to biosynthesize the PHA; and

removing any cell debris and/or contaminants.

2. The method of claim 1, including removing the cell debris by cell disruption and/or enzymatic or light alkaline water washing.

3. The method of claim 1, further comprising suspending the PHA in water to make a dispersion.

4. The method of claim 1, wherein the PHA copolymer comprises 3-hydroxybutyrate (3HB) homopolymer, a copolymer of 3-hydroxybutyrate (3HB) and 4-hydroxybutyrate (4HB), a copolymer of 3-hydroxybutyrate (3HB) and 3-hydroxyvalerate (3HV), or a copolymer of 3-hydroxybutyrate (3HB) and 3-hydroxyhexanoate (3HH) polymers.

5. A method of producing a polyhydroxyalkanoate (PHA) polymer, comprising:

culturing a PHA-producing microorganism, micronutrients, and oxygen in a vessel;

separating PHA from the cultured microorganism;

suspending the PHA in water;

generating a purified PHA from the PHA suspension by removing any remaining non-PHA debris from the microorganism.

6. The method of claim 5, wherein the vessel comprises a culture or fermentation reaction vessel.

7. The method of claim 5, wherein the separation uses filtration or centrifugation.

8. The method of claim 5, wherein the suspension uses purified or distilled water.

9. The method of claim 5, wherein generating the purified PHA comprises centrifuging or filtering.

10. *Intentionally left blank*

11. A composition comprising a polyhydroxyalkanoate (PHA) polymer and up to 15wt% of a viscosity modifying agent comprising a combination of:

an ester of lauric acid, myristic acid, palmitic acid, ~~stearic acid,~~ arachidic acid, or behenic acid; and

glycerin, trimethyl propanol (TMP), pentaerythritol, ~~sorbitol,~~ or combinations thereof.

12. The composition of claim 11, wherein the PHA polymer comprises a PHA copolymer and the PHA polymer or the PHA copolymer comprises 3-hydroxybutyrate (3HB) homopolymer, a copolymer of 3-hydroxybutyrate (3HB) and 4-hydroxybutyrate (4HB), a copolymer of 3-hydroxybutyrate (3HB) and 3-hydroxyvalerate (3HV), or a copolymer of 3-hydroxybutyrate (3HB) and 3-hydroxyhexanoate (3HH) polymers.

13. The composition of claim 12, wherein the PHA polymer or the PHA copolymer comprises 8% to 30% 4HB and 92% to 70% 3HB.

14. The composition of claim 13, wherein the PHA polymer comprises 3-hydroxybutyrate, 4-hydroxybutyrate, or a combination thereof.

15. The composition of claim 11, further comprising about 0.01% to about 5 vol% of a nucleating agent.

16. The composition of claim 11, having a non-tack coating time of less than about 30 seconds.

17. The composition of claim 11, further comprising:

an antioxidant comprising sorbic acid, butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), or combination thereof;

an antimicrobial comprising BHT, BHA, benzoic acid, ascorbic acid or combination thereof;

a dispersant comprising an ester of an unsaturated acid, an ester of polyacrylic acid, or combination thereof;

an ultraviolet light inhibitor comprising a hindered amine light stabilizers, a stearate of magnesium or zinc, or combination thereof;

a stabilizer comprising polyvinyl alcohol (PVOH), vinyl alcohol, a soap of a fatty acid, pyrrolidone, an ethylene oxide, a propylene oxide, or combination thereof;

an emulsifying agent comprising a polyethylene oxide addict of a fatty acid and fatty alcohol, a polysorbate, or combination thereor; or

an anti-blocking agent comprising an inorganic mineral pigment, diatomaceous earth, talc, sodium or potassium aluminosilicate, a mineral mixture of sodium and potassium aluminosilicates, a silica, or combinations thereof.

18. A product of manufacture comprising paper, cardboard, a cellulose fiber-comprising packaging material, a plastic, a paint, a coating, an ink, an adhesive, a device, and/or a fiber containing the PHA copolymer made by the method of claim 1.

19. A product of manufacture comprising paper, cardboard, a cellulose fiber-comprising packaging material, a plastic, a paint, a coating, an ink, an adhesive, a device, and/or a fiber containing the the PHA polymer made by the method of claim 5.

20. A product of manufacture comprising paper, cardboard, a cellulose fiber-comprising packaging material, a plastic, a paint, a coating, an ink, an adhesive, a device, and/or a fiber containing the composition of claim 11.