WHAT IS CLAIMED IS

Claim 1. A method for producing a polyhydroxyalkanoate, comprising the steps of:

preparing a dispersion comprising from 10 to 90 weight percent of at least one polyhydroxyalkanoate, having an initial weight average molecular weight from 500,000 Daltons to 5,000,000 Daltons, and from 10 to 90 weight percent of a solvent selected from the group consisting of water, saturated and unsaturated alkyl alcohols having from 1 to 10 carbon atoms, and mixtures thereof;

adding a base to the dispersion in an amount sufficient to provide a pH in the dispersion from 12 to 14;

hydrolyzing a portion of the at least one polyhydroxyalkanoate by reaction with the base for a reaction time interval, wherein the weight average molecular weight of the at least one polyhydroxyalkanoate is reduced to a final weight average molecular weight which is less than the initial weight average molecular weight;

stopping the reaction by addition of a quenching acid in an amount sufficient to establish a pH less than 12.0 in the dispersion; and

filtering precipitated salts from the dispersion,

wherein all weight average molecular weights are determined in accordance with ASTM D5296,

and wherein the at least one polyhydroxyalkanoate in the dispersion comprises particles having an average particle size from 10 nanometers to 50 microns, as determined using dynamic light scattering in accordance with ISO 22412:2017.

Claim 2. The method of Claim 1, wherein the initial weight average molecular weight is from 500,000 to 5,000,000 Daltons, as determined by ASTM D5296.

Claim 3. The method of Claim 1 or Claim 2, wherein the final weight average molecular weight is from 50,000 to 700,000 Daltons, as determined by ASTM D5296.

Claim 4. The method of any one of Claims 1 to 3, wherein the final weight average molecular weight is from 10 to 95 percent of the initial weight average molecular weight, wherein both weight average molecular weights are determined in accordance with ASTM D5296.

Claim 5. The method of any one of Claims 1 to 4, wherein the solvent is selected from the group consisting of water, methanol, ethanol, isopropanol, and mixtures thereof.

Claim 6. The method of any one of Claims 1 to 5, wherein the solvent comprises ethanol, and the reaction time interval is from 2 to 60 minutes.

Claim 7. The method of any one of Claims 1 to 5, wherein the solvent comprises water, and the reaction time interval is from 1 to 48 hours.

Claim 8. The method of any one of Claims 1 to 7, wherein the base has a pKb which is less than 1.

Claim 9. The method of Claim 8, wherein the base is selected from the group consisting of alkali hydroxide, alkaline earth hydroxides, and mixtures thereof.

Claim 10. The method of any one of Claims 1 to 7, wherein the base has a pKb from 1 to 5.

Claim 11. The method of Claim 10, wherein the base is selected from the group consisting of ammonium hydroxide, aniline, ammonia, and mixtures thereof.

Claim 12. The method of any one of Claims 1 to 11, wherein the dispersion has a solids content from 5 to 20 percent prior to addition of the base.

Claim 13. The method of any one of Claims 1 to 12, wherein the quenching acid is selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, hydrobromic acid, hydroiodic acid, perchloric acid, or chloric acid, acetic acid, citric acid, phosphoric acid, glycolic acid, nitrous acid, sulfurous acid, oxalic acid, benzoic acid, formic acid, and mixtures thereof.

Claim 14. The method of any one of Claims 1 to 13, wherein the hydrolyzing is carried out at a temperature from 20 °C to 60 °C.

Claim 15. The method of any one of Claims 1 to 14, wherein the dispersion further comprises at least one surfactant selected from the group consisting of anionic surfactants, cationic surfactants, amphoteric surfactants, nonionic surfactants, and mixtures thereof.

Claim 16. The method of any one of Claims 1 to 15, wherein the dispersion is prepared using sonication, low shear mixing, and/or ultra-high shear mixing.

Claim 17. The method of any one of Claims 1 to 16, further comprising a step, prior to preparing the dispersion, of synthesizing the at least one polyhydroxyalkanoate by:

mixing a biomass comprising bacteria with a carbon source,

fermenting the biomass and the carbon so that the bacteria of the biomass consume at least a portion of the carbon source and synthesize at least one poly(hydroxyalkanoate) having an initial weight average molecular weight from 500,000 Daltons to 5,000,000 Daltons, and

separating the at least one poly(hydroxyalkanoate) from the biomass.