CLAIMS

Claim 1. A method for producing a poly(hydroxyalkanoate) comprising the steps of:

mixing a biomass comprising bacteria with a petroleum-derived carbon source;

fermenting the biomass and the carbon source at a temperature from 25°C to 35°C for a period of at least 24 hours so that the bacteria of the biomass consume at least a portion of the carbon source and synthesize at least one poly(hydroxyalkanoate); and

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

wherein the petroleum-derived carbon source comprises: (1) a mixture of petroleum fractions, wherein at least 90 weight percent of the petroleum fractions have a boiling point of 400°C or greater as determined by ASTM D7169, and wherein the petroleum fractions are mineral oils, paraffins, or mixtures thereof, or (2) at least 5 weight percent of at least one polycyclic aromatic compound comprising anthracene.

Claim 2. The method of Claim 1, wherein the petroleum-derived carbon source comprises a mixture of petroleum fractions and at least 50 weight percent of the petroleum fractions of the carbon source have a boiling point of 470°C or greater as determined by ASTM D7169.

Claim 3. The method of Claim 1, wherein the biomass comprises bacteria selected from the group consisting of *Cupriavidus sp.*, *Pseudomonas sp.*, *Escherichia sp.*, and mixtures thereof.

Claim 4. The method of Claim 1, wherein the bacteria of the biomass and the carbon source are mixed at a weight ratio of 50 to 99 parts of the carbon source to 1 part of the bacteria.

Claim 5. The method of Claim 1, wherein the biomass and the carbon source are fermented at a pH from 6.5 to 7.5.

Claim 6. The method of Claim 1, wherein the at least one poly(hydroxyalkanoate) has a weight average molecular weight of at least 1,000 daltons, as determined by ASTM 5296-19.

Claim 7. The method of Claim 1, wherein the at least one poly(hydroxyalkanoate) comprises a homopolymer, a poly(hydroxyalkanoate) copolymer, or a poly(hydroxyalkanoate) terpolymer.

Claim 8. The method of Claim 1, wherein the at least one poly(hydroxyalkanoate) comprises poly-3-hydroxybutyrate.

Claim 9. The method of Claim 7, wherein the poly(hydroxyalkanoate) copolymer comprises at least 87 mole percent monomer repeat units of hydroxybutyrate and from 2 to 13 mole percent monomer residues of a second hydroxyalkanoate having from 5 to 12 carbon atoms.

Claim 10. The method of Claim 7, wherein the poly(hydroxyalkanoate) terpolymer comprises from 75 to 99.9 mole percent monomer repeat units of 3-hydroxybutyrate, from 0.1 to 25 mole percent monomer repeat units of 3-hydroxyhexanoate, and from 0.1 to 25 mole percent monomer repeat units of a third 3-hydoxyalkanoate having from 5 to 12 carbon atoms.

Claim 11. The method of any of the preceding claims, wherein the at least one poly(hydroxyalkanoate) comprises a poly(hydroxyalkanoate) having a polymer backbone with at least one anthracene moiety incorporated into the polymer backbone.

Claim 12. The method of any of the preceding claims, wherein the petroleum fractions comprise paraffins.

Claim 13. The method of any of the preceding claims, wherein the carbon source comprises (2) at least 10 weight percent of at least one polycyclic aromatic compound comprising anthracene, or at least 20 weight percent of at least one polycyclic aromatic compound comprising anthracene, or (2) at least 30 weight percent of at least one polycyclic aromatic compound comprising anthracene, wherein the at least one poly(hydroxyalkanoate) comprises a poly(hydroxyalkanoate) having a polymer backbone with at least one anthracene moiety incorporated into the polymer backbone.

Claim 14. A composition comprising at least one poly(hydroxyalkanoate) having a polymer backbone with at least one anthracene moiety incorporated into the polymer backbone.