CLAIMS

1. An organic solvent-free method of producing a polyester, the method comprising

providing a mixture comprising at least one precursor of the polyester, wherein the at least one precursor is a liquid;

drying a gaseous inorganic acid to remove water from the gaseous inorganic acid so as to avoid (i) unintended lowering molecular weight of the polyester and (ii) forming a mixture of polyesters having different terminal groups, wherein drying the gaseous inorganic acid to remove water from the gaseous inorganic acid comprises contacting the gaseous inorganic acid with anhydrous sulfuric acid, wherein the anhydrous sulfuric acid is a concentrated sulfuric acid; and

contacting the mixture with the gaseous inorganic acid to produce the polyester, wherein drying the gaseous inorganic acid is carried out prior to contacting the mixture with the gaseous inorganic acid.

2. The method of claim 1, wherein the at least one precursor comprises at least one monomer of the polyester or at least one oligomer of the polyester.

3. The method of claim 1 or 2, wherein providing the mixture comprises removing water from the at least one precursor.

4. The method of claim 3, wherein removing the water comprises contacting the at least one precursor with a drying agent.

5. The method of claim 4, wherein the drying agent comprises activated silica, calcium chloride, calcium hydride, or an inert gas.

6. The method of any one of claims 1 to 5, wherein the mixture comprises a polymerization initiator.

7. The method of claim 6, wherein the polymerization initiator comprises an alcohol, water, or a polyethylene glycol having one or more terminal hydroxyl groups.

8. The method of any one of claims 1 to 7, wherein the polyester comprises a homopolymer, a random copolymer, or a block copolymer.

9. The method of claim 8, wherein the homopolymer comprises poly(ε-caprolactone), poly(lactic acid), or poly(glycolic acid).

10. The method of claim 8, wherein the random copolymer or the block copolymer comprises polyethylene glycol co-polycaprolactone, poly(lactic-co-glycolic acid), polyethylene glycol co-polyvalerolactone, or a polyester appended to polyethylene glycol.

11. The method of any one of claims 1 to 10, wherein contacting the mixture with the gaseous inorganic acid comprises generating the gaseous inorganic acid from a chemical agent capable of generating the gaseous inorganic acid.

12. The method of claim 11, wherein generating the gaseous inorganic acid comprises mixing (i) sulfuric acid with sodium chloride or (ii) mixing an alcohol with an acetyl chloride or an acid chloride.

13. The method of any one of claims 1 to 11, wherein the gaseous inorganic acid comprises gaseous hydrochloric acid or gaseous nitric acid.

14. The method of any one of claims 1 to 13, wherein contacting the mixture with the gaseous inorganic acid is carried out in an inert environment.

15. The method of claim 14, wherein the inert environment comprises argon or nitrogen.

16. The method of any one of claims 1 to 15, wherein contacting the mixture with the gaseous inorganic acid is carried out at a temperature which maintains the polyester in a liquid state.

17. The method of claim 16, wherein the temperature is at least 60°C.

18. The method of claim 16 or 17, wherein the temperature is 100°C or less.

19. The method of any one of claims 1 to 18, further comprising subjecting the mixture to an inert gas flow to remove the gaseous inorganic acid after the polyester is produced.