WHAT IS CLAIMED IS:

1. A method for comprising:
saccharifying ~~treating~~ a reduced recalcitrance lignocellulosic and/or cellulosic material with one or more enzymes to obtain a saccharified biomass sugar solution comprising a mixture of sugars;
selectively fermenting one sugar in the mixture of sugars ~~and/or microorganisms~~ to produce an amino-alpha, omega-dicarboxylic acid.

2. The method of claim 1 further comprising converting the amino-alpha, omega-dicarboxylic acid to ~~product~~an oligomer, polymer or polymer derivative.

3. The method of claim 1 wherein a feedstock is pretreated with at least one of irradiation, sonication, oxidation, mechanical size reduction, pyrolysis and steam explosion to produce the reduced recalcitrance lignocellulosic and/or cellulosic material.

4. The method of claim 3 wherein irradiation is performed with an electron beam.

5. The method of claim 2 wherein converting the amino-alpha, omega-dicarboxylic acid to the product comprises chemically converting, e.g., converting aspartic acid to a polyamide.

6. The method of claim 2 wherein converting the amino-alpha, omega-dicarboxylic acids to the product comprises biochemically converting, e.g., converting aspartic acid to a polyamide.

7. The method of claim 5 wherein chemically converting is selected from the group consisting of polymerization, isomerization, esterification, amidation, cyclization, oxidation, reduction, disproportionation, phosgenation, and combinations thereof.

8. The method of any one of the above claims wherein ~~treating is performed with one or more enzymes to release one or more sugars (such as~~ the sugars in the mixture of sugars comprise one or more of glucose, xylose, sucrose, maltose, lactose, mannose, galactose, arabinose and mixtures of these dimers of these such as cellobiose, heterodimers of these ~~such as sucrose,~~ oligomers of these, and mixtures of these~~) from the lignocellulosic and/or cellulosic material prior to producing the amino-alpha, omega-dicarboxylic acid~~.

~~9. The method of claim 1 wherein producing the amino-alpha, omega-dicarboxylic acid comprises treating initially to release one or more sugars from the lignocellulosic and/or cellulosic material followed by fermenting one of the sugars with the one or more of the microorganisms.~~

~~10~~9. The method of any one of claims 8 ~~or 9~~ further comprising purifying the one or more sugars (e.g., electrodialysis, distillation, centrifugation, filtration, ion

exchange).

~~11~~10. The method of any one of the above claims wherein the amino-alpha, omega-dicarboxylic acid is selected from the group consisting of aspartic acid, glutamic acid and the amino substituted malonic, adipic, pimelic, suberic, azelaic, sebacic, and substituted derivatives thereof.

~~12~~11. The method of claim ~~11~~ 10 wherein the amino-alpha, omega-dicarboxylic acid is aspartic acid or glutamic acid.

~~13~~12. The method of claim 5 wherein converting comprises polymerizing the amino-alpha, omega-dicarboxylic acid to a polymer.

~~14~~13. The method of claim ~~13~~ 12 wherein a polymerizing method is selected from the group consisting of direct condensation of the amino-alpha, omega-dicarboxylic acid, azeotropic condensation of the amino-alpha, omega-dicarboxylic acid, and cyclization of the amino-alpha, omega-dicarboxylic acid followed by ring opening polymerization.

~~15~~14. The method of claim ~~13~~ 12 or ~~14~~ 13 wherein the polymerizing further comprises coupling agents and/or chain extenders.

~~16~~15. The method of claim ~~15~~ 14 wherein the coupling agents and/or chain extenders are selected from the group consisting of phosgene, triphosgene, carbonyl diimidazole, dicyclohexylcarbodiimide, isocyanate, acid chlorides, acid anhydrides, epoxides, thiirane, oxazoline, orthoester, and combinations of these.

~~17~~16. The method of claim ~~14~~ 15 wherein the polymerization method is azeotropic condensation.

~~18~~17. The method of any one of claim ~~13~~12-~~17~~ 16 further comprising the utilization of catalysts and/or promoters selected from the group consisting of protonic acids, H_3PO_4, H_2SO_4, methane sulfonic acid, p-toluene sulfonic acid, supported sulfonic acid, metals, Mg, Al, Ti, Zn, Sn, metal oxides, TiO_2, ZnO, GeO_2, ZrO_2, SnO, SnO_2, Sb_2O_3, metal halides, $ZnCl_2$, $SnCl_2$, $SnCl_4$, $Mn(AcO)_2$, $Fe_2(LA)_3$, $Co(AcO)_2$, $Ni(AcO)_2$, $Cu(OA)_2$, $Zn(LA)_2$, $Y(OA)_3$, $Al(i\text{-}PrO)_3$, $Ti(BuO)_4$, $TiO(acac)_2$, $(Bu)_2SnO$ and combinations of these.

~~19~~18. The method of any one of claims ~~13~~ 12 or ~~18~~ 17 further comprising conducting at least a portion of the polymerization at a temperature between about 100 and 240° C.

~~20~~19. The method of any one of claims ~~13~~ 12 through ~~19~~ 18 further comprising conducting at least a portion of the polymerization under vacuum (e.g., between about 0.0001 torr to 300 torr).

2120. The method of claim 14 13 wherein the polymerization method includes cyclizing the amino-alpha, omega-dicarboxylic acid followed by ring opening.

2221. The method of any one of claims 13 12 through 20 19 wherein converting further includes blending the polymer with a second polymer.

2322. The method of claim 22 21 wherein the second polymer is selected from the group consisting of polyglycols, polyvinyl acetate, polyolefins, styrenic resins, polyacetals, poly(meth)acrylates, polycarbonate, polybutylene succinate, elastomers, polyurethanes, natural rubber, polybutadiene, neoprene, silicone, and combinations of these.

2423. The method of claim 1 where the amino-alpha, omega-dicarboxylic acid amine group is reacted with a protecting group to form a protected amino-alpha, omega- dicarboxylic acid.

2524. The method of any one of claims 13 12 through 23 22 further comprising co-polymerizing the amino-alpha, omega-dicarboxylic acid or the protected amino-alpha, omega- dicarboxylic acid with a monomer.

2625. The method of claim 25 24 wherein the monomer is selected from the group consisting of elastomeric units, lactones, carbonates, morpholinediones, epoxides, 1,4- benzodioxepin-2,5-(3H)-dione Glycosalicylide, 1,4-benzodioxepin-2,5-(3H, 3- methyl)-dione Lactosalicylide, dibenzo-1,5 dioxacin-6-12-dione disalicylide, morpholine-2,5-dione, 1,4-dioxane-2,5-dione glycolide, oxepane-2-one ε- caprolactone, 1,3-dioxane-2-one trimethylene carconate, 2,2-dimethyltrimethylene carbonate, 1,5-dioxepane-2-one, 1,4-dioxane-2-one p-dioxanone, gamma-butyrolactone, beta-butyrolactone, beta-Me-delta-valerolactone, 1,4-dioxane-2,3- dione ethylene oxalate, 3-[benzyloxycarbonyl methyl]-1,4-dioxane-2,5-dione, ethylene oxide, propylene oxide, 5,5'(oxepane-2-one), 2,4,7,9-tetraoxaspiro[5,5]undecane-3,8-dione Spiro-bid-dimethylene caronate, diols and diamines and mixtures of these.

2726. The method of any one of claims 13 12 through 26 25 further comprising combining the polymer with fillers.

2827. The method of claim 27 26 wherein the filler is selected from the group consisting of silicates, layered silicates, polymer and organically modified layered silicate, synthetic mica, carbon, carbon fibers, glass fibers, boric acid, talc, montmorillonite, clay, starch, corn starch, wheat starch, cellulose fibers, paper, rayon, non-woven

fibers, wood flours, whiskers of potassium titanate, whiskers of aluminum borate, 4,4'-thiodiphenol, glycerol and combinations of these.

2928. The method of claim ~~27~~ 26 or ~~28~~ 27 wherein combining further includes extrusion and/or compression molding.

3029. The method of any one of claims ~~13~~ 12 through ~~29~~ 28 further comprising cross linking the polymer.

3130. The method of claim ~~30~~ 29 wherein a cross linking agent is utilized to cross link the polymer and the cross-linking agent selected from the group consisting of 5,5'- bis(oxepane-2-one)(bis- ε -caprolactone)), spiro-bis-dimethylene carbonate, peroxides, dicumyl peroxide, a,a'-bis(tert- butylperoxy)-diisopropylbenzene benzoyl peroxide, unsaturated alcohols, hydroxyethyl methacrylate, 2-butene-1,4-diol, unsaturated anhydrides, maleic anhydride, saturated epoxides, glycidyl methacrylate, irradiation and combinations of these.

3231. The method of any one of claims ~~13~~ 12 through ~~31~~ 30 further comprising processing the polymer by a method selected from injection molding, blow molding and thermoforming.

3332. The method of any one of claims ~~13~~ 12 through ~~32~~ 31 further comprising combining the polymer with a dye.

3433. The method of claim ~~33~~ 32 wherein the dye is selected from the group consisting of blue 3, blue 356, brown 1, orange 29, violet 26, violet 93, yellow 42, yellow 54, yellow 82 and combinations of these.

3534. The method of any one of claims ~~13~~ 12 through ~~34~~ 33 further comprising combining the polymer with a fragrance.

3635. The method of claim ~~35~~ 34 wherein the fragrance is selected from the group consisting of wood, evergreen, redwood, peppermint, cherry, strawberry, peach, lime, spearmint, cinnamon, anise, basil, bergamot, black pepper, camphor, chamomile, citronella, eucalyptus, pine, fir, geranium, ginger, grapefruit, jasmine, juniper berry, lavender, lemon, mandarin, marjoram, musk, myrrh, orange, patchouli, rose, rosemary, sage, sandalwood, tea tree, thyme, wintergreen, ylang ylang, vanilla, new car or mixtures of these fragrances.

3736. The method of claims ~~35~~ 34 or ~~36~~ 35 wherein the fragrances are combined with the polymer in an amount between about 0.005 % by weight and about 20 % by weight (e.g., between about 0.1 % and about 5 wt. %, between about 0.25 wt.% and about 2.5 %.

3837. The method of any one of claims ~~13~~ 12 through ~~37~~ 36 wherein converting further includes blending the polymer with a plasticizer.

3938. The method of claim ~~38~~ 37 wherein plasticizer is selected from the group consisting of triacetine, tributyl citrate, polyethylene glycol, fully acetylated monoglyceride based on fully hydrogenated castor oil, glycerine and acetic acid, diethyl bishydroxymethyl malonate and mixtures of these.

4039. The method of any one of claims ~~13~~ 12 through ~~39~~ 38 further comprising grafting a molecule to the polymer.

4140. ~~41.~~ The method of claim ~~40~~ 39 wherein the molecule is selected from a monomer or a polymer.

4241. The method of claim ~~40~~ 39 or ~~41~~ 40 further including treating the polymer with a peroxide, heating above about 120°C, irradiation and combinations thereof.

4342. The method of any one of claims ~~13~~ 12 through ~~42~~ 41 further comprising shaping, molding, carving, extruding and/or assembling the polymer into the product.

4443. The method of any one of claims ~~13~~ 12 through ~~43~~ 42 wherein the product is selected from the group consisting of personal care items, tissues, towels, diapers, green packaging, compostable pots, consumer electronics, laptop casings, mobile phone casings, appliances, food packaging, disposable packaging, food containers, drink bottles, garbage bags, waste compostable bags, mulch films, controlled release matrices, controlled release containers, containers for fertilizers, containers for pesticides, containers for herbicides, containers for nutrients, containers for pharmaceuticals, containers for flavoring agents, containers for foods, shopping bags, general purpose film, high heat film, heat seal layer, surface coating, disposable tableware, plates, cups, forks, knives, spoons, sporks, bowls, automotive parts, panels, fabrics, under hood covers, carpet fibers, clothing fibers, fibers for garments, fibers for sportswear, fibers for footwear, surgical sutures, implants, scaffolding and drug delivery systems.

4544. The method of any one of claims ~~13~~ 12 through ~~43~~ 42 wherein the product is selected from flavor enhancer, coatings, dispersants, superabsorbent, drug delivery systems, plant growth, metal chelator, waste water treatment, water treatment, and automotive additives.

~~46. A product comprising:~~

~~one or more converted amino-alpha, omega-dicarboxylic acid, wherein~~

the amino-alpha, omega-dicarboxylic acid (s) is produced by the fermentation of sugars derived from the acidic or enzymatic saccharification of an irradiated lignocellulosic and/or cellulosic material .

47. The product of claim 46 wherein the amino-alpha, omega-dicarboxylic acid is selected from the group consisting of aspartic acid, glutamic acid and 2-aminoadipic acid.

48. The product of claim 46 or 47 wherein the product is a polymer including one or more of the converted amino-alpha, omega dicarboxylic acids in the polymer backbone.

49. The product of any one of claim 48 further comprising a non-amino-alpha, omegadicarboxylic acid in the polymer backbone.

50. The product of any one of claims 46 through 49 wherein the polymer is cross-linked.

51. The product of any one of claims 46 through 49 wherein the polymer is a graft co-polymer.

52. The product of any one of claims 46 through 51 wherein the one or more amino-alpha, omega-dicarboxylic acid includes aspartic and glutamic acid and mixtures thereof.

53. The product any one of claims 46 through 52 further comprising blending the polymer with a second polymer, a plasticizer, an elastomer, a fragrance, a dye, a pigment, a filler or a mixture of these.

54. A system for polymerization amino-alpha, omega-dicarboxylic acid comprising;
a reaction vessel, a screw extruder and a condenser;
a recirculating fluid flow path from an outlet of the reaction vessel to an inlet of the screw extruder and from an outlet of the screw extruder to an inlet to the reaction vessel, and
a fluid flow path from a second outlet of the reaction vessel to an inlet of the condenser.

55. The system of claim 54 further comprising a vacuum pump in fluid connection with the second fluid flow path for producing a vacuum in the second fluid flow path.

56. The system of claim 54 or 55 further comprising a control valve that in a first position provides a non-disrupted flow in the recirculating fluid flow path and in a second position provides a second fluid flow path.

57. The system of claim 56 wherein when the second fluid flow path is from the outlet of the reaction vessel to an inlet of a pelletizer.

58. The system of claim 56 wherein the second fluid flow path is from the outlet of the reaction vessel to the inlet of the extruder and from the outlet of the extruder to the inlet of a pelletizer.

59. A method of making a polymer or copolymer, the method comprising evaporating water as it is formed during condensation of a amino alpha, omega-dicarboxylic acid polymer as it traverses a surface of a thin film evaporator.

60. The method of claim 59, where the thin film evaporator comprises a thin film polymerization/devolatilization device

61. The method of claim 60, where an extruder is fluid communication with the thin film polymerization/devolatilization device and the effluent of the extruder is the poly hydroxy-carboxylic acid polymer or effluent of the extruder is recycled to the thin film evaporator.

62. The method of claim 61, where the extruder is a twin screw extruder.

63. The method of any one of the claims 59 through 62 wherein the amino-alpha, omega- dicarboxylic acid oligomer is derived from the monomer group consisting of D- aspartic acid, L-aspartic acid, D-glutamic acid, L-glutamic acid, and mixtures thereof.

64. The method of any one of claims 59-63, where at least a part of the thin film evaporator operates at a temperature of 100 to 260°C.

65. The method of any one of claims 59-64, where at least a part of the thin film evaporator operates at a pressure of 0.0001 torr or lower.

66. The method of any one of the claims 59-65, where prior to transferring the poly-hydroxy-carboxylic acid to a thin film polymerization/devolatilization device or during operation of the thin film polymerization/ devolatilization device a catalyst deactivator and/or stabilizer agent is added.

67. The method of claim 66, comprising removing the deactivated/stabilized catalyst prior to, during or after the thin film polymerization/ devolatilization device by a filtration device.

68. The method of claim 67 where the filtration device is in fluid communication with the thin film polymerization/ devolatilization device.