Claims

【Claim 1】 A biobased composition comprising an amorphous polyhydroxyalkanoate (PHA), a polyester, and a pore-forming agent.

【Claim 2】 The biobased composition according to claim 1, wherein a puncture toughness of the biobased composition decreases by 10% or less, stays the same, or increases upon reduction of a density of the biobased composition at least by 5%.

【Claim 3】 The biobased composition according to claim 2, wherein the density is decreased by stretching in a machine direction orientation (MDO) by a stretch ratio of 0.5X or more.

【Claim 4】 The biobased composition according to claim 2, wherein the puncture toughness of the biobased composition increases at least by 10%.

【Claim 5】 The biobased composition according to claim 1, wherein a biobased carbon content of the biobased composition as measured according to ASTM D6866 is at least 75%.

【Claim 6】 The biobased composition according to claim 1, wherein the pore-forming agent comprises organic or inorganic particles.

【Claim 7】 The biobased composition according to claim 1, wherein the pore-forming agent comprises at least one selected from the group consisting of calcium carbonate ($CaCO_3$), talc, wallstonite ($CaSiO_3$), aluminum oxide ($Al2O_3$), and combinations thereof, and wherein the biobased composition has the pore-forming agent in an amount from 1 to 50 wt%.

【Claim 8】 The biobased composition according to claim 1, wherein the polyester comprises polylactide (PLA), and wherein the biobased composition has the

polylactide (PLA) in an amount from 55 to 99 wt%.

【Claim 9】 The biobased composition according to claim 1, wherein the biobased composition has the amorphous PHA in an amount from 1 to 45 wt%.

【Claim 10】 The biobased composition according to claim 1, wherein the amorphous PHA has a crystallinity of less than 5% by weight.

【Claim 11】 The biobased composition according to claim 1, wherein the amorphous PHA comprises a copolymer including 3-hydroxybutyrate (3-HB), a copolymer including 4-hydroxybutyrate (4-HB), a copolymer including 3-hydroxypropionate (3-HP), a copolymer including 3-hydroxyhexanoate (3-HH), a copolymer including 3-hydroxyoctanoate (3-HO), a copolymer including 3-hydroxy valerate (3-HV), a copolymer including 4-hydroxyvalerate (4-HV), a copolymer including 5-hydroxyvalerate (5-HV), or a copolymer including 6-hydroxyhexanoate (6-HH).

【Claim 12】 The biobased composition according to claim 1, wherein the amorphous PHA comprises a copolymer including at least one selected from the group consisting of 4-hydroxybutyrate (4-HB), 3-hydroxypropionate (3-HP), 3-hydroxyhexanoate (3-HH), 3-hydroxyoctanoate (3-HO), 3-hydroxyvalerate (3-HV), 4-hydroxyvalerate (4-HV), 5- hydroxyvalerate (5-HV), and 6-hydroxyhexanoate (6-HH), wherein the at least one is at a concentration from 25 to 45 wt% with respect to a total amount of the amorphous PHA.

【Claim 13】 The biobased composition according to claim 1, wherein the polylactide (PLA) is 100% biobased, and the amorphous PHA is at least 75% biobased.

【Claim 14】 The biobased composition according to claim 1, wherein the biobased composition excludes a plasticizer for increasing tensile elongation, impact strength or tear strength of a film comprising the biobased composition.

【Claim 15】A film comprising the biobased composition of claim 1.

【Claim 16】The film according to claim 15, wherein the film comprises a microporous film.

【Claim 17】A product comprising the biobased composition according to claim 1, wherein the product is produced by using a blown or cast film process followed by subsequent orientation in one or two directions.

【Claim 18】The product according to claim 17, wherein the product has a density reduction of at least 10% relative to a non-porous un-oriented baseline film.

【Claim 19】A method of producing a stretched film, the method comprising stretching the biobased composition of claim 1 or the film of claim 16 in a stretch ratio of 10 or less to produce the stretched film.

【Claim 20】The method according to claim 19, wherein the method further comprises, before the stretching, extruding by a blown film extrusion, injection molding, thermoforming the biobased composition.