SUMMARY

[006A] In one aspect, the present disclosure refers to a hot melt adhesive comprising:

from 10 to 20 weight percent of a lactic acid oligomer or polymer having a weight average molecular weight from 1500 to 3000;

from 40 to 75 weight percent of polylactide having a weight average molecular weight from 10,000 to 18,000;

from 20 to 35 weight percent of a polyester formed from the copolymerization of one or more diols and one or more dicarboxylic acids; and

from 0.5 to 5 weight percent of a copolymer of vinyl acetate and a mono-unsaturated short chain fatty acid, the fatty acid having from 4 to 12 carbon atoms,

wherein all weight percentages are based on the overall weight of the hot melt adhesive.

[006B] In another aspect, the present disclosure refers to an adhesive-coated substrate comprising:

a substrate having at least a first side; and

a hot melt adhesive coating applied to at least of portion of the substrate first side, wherein the hot melt adhesive coating comprises

from 10 to 20 weight percent of a lactic acid oligomer or polymer having a weight average molecular weight from 1500 to 3000,

from 40 to 75 weight percent of polylactide having a weight average molecular weight from 10,000 to 18,000,

from 20 to 35 weight percent of a polyester formed from the copolymerization of one or more diols and one or more dicarboxylic acids, and

from .5 to 5 weight percent of a copolymer of vinyl acetate and a mono-unsaturated short chain fatty acid, the fatty acid having from 4 to 12 carbon atoms,

wherein all weight percentages are based on the overall weight of the hot melt adhesive.

[006C] In a further aspect, the present disclosure refers to a method for making a hot melt adhesive, comprising the steps of:

melt blending, at a temperature from 140 to 175 °C, a mixture which comprises

from 10 to 20 weight percent of a lactic acid oligomer or polymer having a weight average molecular weight from 1500 to 3000,

from 40 to 75 weight percent of polylactide having a weight average molecular weight from 10,000 to 18,000,

from 20 to 35 weight percent of a polyester formed from the copolymerization of one or more diols and one or more dicarboxylic acids, and

from 0.5 to 5 weight percent of a copolymer of vinyl acetate and a mono-unsaturated short chain fatty acid, the fatty acid having from 4 to 12 carbon atoms; and

further blending the mixture with from 1 to 5 weight percent of a carboxylic acid or a carboxylic acid derivative, at a temperature at a temperature from 140 to 175 °C to provide a stabilized hot melt adhesive,

wherein all weight percentages are based on the overall weight of the hot melt adhesive.

[007] The present disclosure provides a hot melt adhesive composition. According to one example, the hot melt adhesive includes at least the following components: (1) from about 10 to about 20 weight percent of a lactic acid oligomer or polymer having a weight average molecular weight from about 1500 to about 3000; (2) from about 40 to about 75 weight percent of polylactide having a weight average molecular weight from about 10,000 to about 18,000; (3) from about 20 to about 35 weight percent of a polyester formed from the copolymerization of one or more diols and one or more dicarboxylic acids; and (4) from about 0.5 to about 5 weight percent of a copolymer of vinyl acetate and a mono-unsaturated short chain fatty acid, the fatty acid having from 4 to 12 carbon atoms, All of the aforementioned weight percentages are based on the overall weight of the hot melt adhesive composition.

[008] In certain examples of the present disclosure, the hot melt adhesive preferably has a viscosity from about 1000 centipoise to about 6000 centipoise at a

WHAT IS CLAIMED IS:

Claim 1. A hot melt adhesive comprising:

from 10 to 20 weight percent of a lactic acid oligomer or polymer having a weight average molecular weight from 1500 to 3000;

from 40 to 75 weight percent of polylactide having a weight average molecular weight from 10,000 to 18,000;

from 20 to 35 weight percent of a polyester formed from the copolymerization of one or more diols and one or more dicarboxylic acids; and

from 0.5 to 5 weight percent of a copolymer of vinyl acetate and a mono-unsaturated short chain fatty acid, the fatty acid having from 4 to 12 carbon atoms,

wherein all weight percentages are based on the overall weight of the hot melt adhesive.

Claim 2. The hot melt adhesive of Claim 1, wherein the hot melt adhesive has a viscosity from 1000 centipoise to 6000 centipoise at a temperature of 143°C.

Claim 3. The hot melt adhesive of Claim 1, wherein the lactic acid oligomer or polymer has a viscosity from 350 centipoise to 450 centipoise at a temperature of 280°C.

Claim 4. The hot melt adhesive of Claim 1, wherein the polylactide has a viscosity from 1800 centipoise to 2200 centipoise at a temperature of 143°C.

Claim 5. The hot melt adhesive of Claim 1, wherein the polylactide further comprises a polymer capping group formed by reaction of the polylactide with a carboxylic acid or a carboxylic acid derivative.

Claim 6. The hot melt adhesive of Claim 1, wherein the polyester has a viscosity from 15,000 centipoise to 35,000 centipoise at a temperature of 216°C.

Claim 7. The hot melt adhesive of Claim 1, wherein the polyester has a weight average molecular weight from 55,000 to 72,000.

Claim 8. The hot melt adhesive of Claim 1, wherein the polyester further comprises a polymer capping group formed by reaction of the polylactide with a carboxylic acid or a carboxylic acid derivative.

Claim 9. The hot melt adhesive of Claim 1, wherein the polyester is polybutylene(succinate-co-adipate) (“PBSA”).

Claim 10. The hot melt adhesive of Claim 1, wherein the mono-unsaturated short chain fatty acid is crotonic acid.

Claim 11. An adhesive-coated substrate comprising:

a substrate having at least a first side; and

a hot melt adhesive coating applied to at least of portion of the substrate first side, wherein the hot melt adhesive coating comprises

from 10 to 20 weight percent of a lactic acid oligomer or polymer having a weight average molecular weight from 1500 to 3000,

from 40 to 75 weight percent of polylactide having a weight average molecular weight from 10,000 to 18,000,

from 20 to 35 weight percent of a polyester formed from the copolymerization of one or more diols and one or more dicarboxylic acids, and

from 0.5 to 5 weight percent of a copolymer of vinyl acetate and a mono-unsaturated short chain fatty acid, the fatty acid having from 4 to 12 carbon atoms,

wherein all weight percentages are based on the overall weight of the hot melt adhesive.

Claim 12. The adhesive-coated substrate of Claim 11, wherein the hot melt adhesive has a viscosity from 1000 centipoise to 6000 centipoise at a temperature of 143°C.

Claim 13. The adhesive-coated substrate of Claim 11, wherein the lactic acid oligomer or polymer has a viscosity from 350 centipoise to 450 centipoise at a temperature of 280°C.

Claim 14. The adhesive-coated substrate of Claim 11, wherein the polylactide has a viscosity from 1800 centipoise to 2200 centipoise at a temperature of 143°C.

Claim 15. The adhesive-coated substrate of Claim 11, wherein the polylactide further comprises a polymer capping group formed by reaction of the polylactide with a carboxylic acid or a carboxylic acid derivative.

Claim 16. The adhesive-coated substrate of Claim 11, wherein the polyester has a viscosity from 15,000 centipoise to 35,000 centipoise at a temperature of 216°C.

Claim 17. The adhesive-coated substrate of Claim 11, wherein the polyester has a weight average molecular weight from 55,000 to 72,000.

Claim 18. The adhesive-coated substrate of Claim 11, wherein the polyester further comprises a polymer capping group formed by reaction of the polylactide with a carboxylic acid or a carboxylic acid derivative.

Claim 19. The adhesive-coated substrate of Claim 11, wherein the polyester is polybutylene(succinate-co-adipate) ("PBSA").

Claim 20. The adhesive-coated substrate of Claim 11, wherein the mono-unsaturated short chain fatty acid is crotonic acid.

Claim 21. A method for making a hot melt adhesive, comprising the steps of:

melt blending, at a temperature from 140 to 175 °C, a mixture which comprises

from 10 to 20 weight percent of a lactic acid oligomer or polymer having a weight average molecular weight from 1500 to 3000,

from 40 to 75 weight percent of polylactide having a weight average molecular weight from 10,000 to 18,000,

from 20 to 35 weight percent of a polyester formed from the copolymerization of one or more diols and one or more dicarboxylic acids, and

from 0.5 to 5 weight percent of a copolymer of vinyl acetate and a mono-unsaturated short chain fatty acid, the fatty acid having from 4 to 12 carbon atoms; and

further blending the mixture with from 1 to 5 weight percent of a carboxylic acid or a carboxylic acid derivative, at a temperature at a temperature from 140 to 175 °C to provide a stabilized hot melt adhesive,

wherein all weight percentages are based on the overall weight of the hot melt adhesive.

Claim 22. The method of Claim 21, wherein the carboxylic acid or a carboxylic acid derivative comprises an acid anhydride.

Claim 23. The method of Claim 21, wherein the polyester has a weight average molecular weight from 55,000 to 72,000.

Claim 24. The method of Claim 21, wherein the polyester is polybutylene(succinate-co-adipate) ("PBSA").

Claim 25. The method of Claim 21, wherein the mono-unsaturated short chain fatty acid is crotonic acid.