(54) BIODEGRADABLE BLISTER PACKAGE

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(57) ABSTRACT
A biodegradable blister package comprising polylactic acid resin is disclosed. The blister package includes a blister portion made of a biodegradable material and a clamshell portion having a first half and a second half, wherein the blister portion is at least partially between the first and the second halves of the clamshell portion. The clamshell portion comprises a substrate material including at least one layer of paperboard and at least one layer of polylactic acid adhered to the paperboard layer.
FIGURE 3

301

307 (Optional)

300
306
305
304
302
303
BIODEGRADABLE BLISTER PACKAGE

[0001] This non-provisional application relies on the filing date of provisional U.S. Application Ser. No. 60/857,035 filed on Nov. 6, 2006, which is incorporated herein by reference, having been filed within twelve (12) months thereof, and priority thereto is claimed under 35 USC §1.19(c).

BACKGROUND OF THE INVENTION

[0002] Blister packages, clamshell packages and other like packaging structures (collectively referred to herein as "blister packages") have been used to package various consumer goods, such as pharmaceuticals, electronics, health and beauty products and the like. Blister packages are available in a wide variety of shapes, sizes and configurations according to their applications.

[0003] Traditionally, blister packages are formed from a substrate material that includes a paperboard layer having a first surface coated with a printable material such as clay, a second surface having a layer of extruded plastic adhered thereto, and an adhesive material such as ethylene methylacrylate copolymer applied over the extruded plastic layer. The resulting substrate may be sealable by, for example, a heated platen, radio frequency energy and/or ultrasonic energy.

[0004] Plastics such as polyethylene have been used for blister packaging applications. After discarded, substantial energy is required for burning and disposing these plastics. Furthermore, these plastics decompose slowly in natural environments due to their chemical stability and thus semi-permanently remain in the soil.

[0005] To address these concerns, extensive efforts have recently been spent on developing biodegradable materials for packaging applications. One type of biodegradable materials is polylactic acid (PLA) resin, since it decomposes by microorganisms naturally present in soils into harmless substances. PLA is derived from plants, and minimum energy is required in decomposition.

[0006] U.S. Pat. No. 7,128,969 disclosed a biologically-degradable, thermoformed package made from biaxially-drawn film that is moulded by application of pneumatic and/or mechanical forces. The biaxially-drawn film comprises a base layer containing a polymer made from at least one hydroxy-carboxylic acid and ≥ 0.2 wt %, based on the weight of the layer, of a thermoplastic polymer selected from the group consisting of polypropylene, polyethylene, and aromatic polyester.

[0007] U.S. Pat. No. 7,235,287 disclosed biodegradable laminated sheet including at least two layers. Each layer is made of a resin composition comprising 75-25% wt of a polylactic acid, and 25-75% wt of a polyester resin having a glass transition temperature not exceeding 0°C and a melting point higher than the glass transition temperature of the polylactic acid but not exceeding the melting point of the polylactic acid.

[0008] U.S. Pat. No. 7,173,080 describes a biodegradable resin composition for molding application comprising a biodegradable polymer; phyllosilicate containing a primary, secondary or tertiary amine salt, a quaternary ammonium salt or a phosphonium salt; and at least one compound selected from the group consisting of a polyalkylene oxide, an aliphatic polyester, a polylactol ester and a polycarboxylic acid ester, having a boiling point of not lower than 250°C and a number-average molecular weight of 200-50,000. The biodegradable polymer comprises polyactic acid having a melting point of not lower than 160°C and a biodegradable polyester resin having a melt flow rate of 0.1-50 g/10 mm.

[0009] There is still a need for a blister package that is environmentally friendly and its disposal of the blister package after use does not contribute to landfill problem which is common with current non-biodegradable blister packages.

SUMMARY OF THE DISCLOSURE

[0010] The present disclosure relates to a blister package including a blister portion made of a biodegradable material and a clamshell portion having a first half and a second half, wherein the blister portion is at least partially between the first and the second halves of the clamshell portion. The clamshell portion comprises a substrate material including at least one layer of paperboard and at least one layer of polylactic acid adhered to the paperboard layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a cross-sectional view of one aspect of the disclosed blister package substrate material;

[0012] FIG. 2 is a cross-sectional view of another aspect of the disclosed blister package substrate material;

[0013] FIG. 3 is a cross-sectional view of another aspect of the disclosed blister package substrate material;

[0014] FIG. 4 is a top plan view of one aspect of a clamshell portion of a biodegradable blister package formed from the disclosed blister package substrate material;

[0015] FIG. 5 is a side elevational view of one aspect of a blister of a biodegradable blister package adapted to engage the clamshell portion of FIG. 4; and

[0016] FIG. 6 is a side elevational view of one aspect of the disclosed biodegradable blister package including the clamshell portion of the FIG. 4 and the blister portion of FIG. 5.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0017] The following detailed description illustrates an embodiment of the present invention; however, it is not intended to limit the scope of the appended claims in any manner.

[0018] FIG. 1 shows one embodiment of the substrate suitable for use in the blister package of the present disclosure. The substrate (100) may include a paperboard layer (101) having a first surface (102) and a second surface (103), and a PLA layer (104) adhered to the first surface (102) of the paperboard layer (101). When desired, a layer of coating (105) may be applied to the second surface (103) of the paperboard (101) to enhance printability of text and/or graphics. The coating layer is selected based on compatibility with the printing method and the composition of paperboard. For example, the coating layer may include clay, titanium dioxide and/or calcium carbonate.

[0019] FIG. 2 shows another embodiment of the substrate suitable for use in the blister package of the present disclosure. The substrate (200) may include a paperboard layer (201) having a first surface (202) and a second surface (203), a PLA layer (204) extruded over the first surface (202) of the paperboard layer (201), a layer of polylactic acid film (205)
positioned over the extruded polylactic acid layer (204), and optionally, a PLA layer (206) extruded over the PLA film (205). When desired, the layer of coating (207) may be applied over the second surface (203) of the paperboard layer (201) to enhance printability.

[0020] FIG. 3 shows another embodiment of the substrate suitable for use in the blister package of the present disclosure. The substrate (300) may include a paperboard layer (301) having a first surface (302) and a second surface (303), an adhesive layer (304) positioned over the first surface (302) of the paperboard layer (301), a layer of polylactic acid film (305) positioned over the adhesive layer (304) and, optionally, a second adhesive layer (306) positioned over the polylactic acid film layer (305). When desired, the layer of coating (307) may be applied over the second surface (303) of the paperboard layer (301) to enhance printability.

[0021] The adhesive layers may include any biodegradable adhesive capable of bonding to the PLA film layer and/or the paperboard layer. For example, the adhesive layers may include polyvinyl alcohol.

[0022] The paperboard suitable for use in the present disclosure may be any conventional grades. These include, but are not limited to, solid bleached sulfate (SBS), coated natural kraft, folding boxboard, recycled board, and unbleached board. The grade of paperboard is selected based on the desired appearance of the final package.

[0023] In one embodiment of the present disclosure, the paperboard has a caliper of about 0.010 inches or greater. In one embodiment of the present disclosure, the paperboard has a caliper range of about 0.011 inches to about 0.014 inches. An example of such a substrate is a 12-point SBS board manufactured by MendWestvaco Corporation. The paperboard layer 12 may also be an unbleached board, depending on the desired appearance of the final package.

[0024] In one embodiment, the PLA layer is applied as a layer of polylactic acid extruded onto the first surface of the paperboard. In one embodiment, a layer of polylactic acid film is laminated to the first surface of the paperboard.

[0025] At this point, those skilled in the art will appreciate that various numbers and combinations of layers of polylactic acid, whether as an extruded layer, a film or the like, and biodegradable adhesive may be applied onto the paperboard substrate layer to form a blister package substrate material within the scope of the present disclosure.

[0026] In FIG. 4 shows one embodiment of the clamshell portion (400) of the disclosed blister package. The clamshell portion (400) may be formed from the substrate materials (100), (200), or (300) discussed above. For example, the clamshell portion (400) may be formed by die cutting a sheet of blister packaging substrate material (100), (200), or (300), or by any other available means.

[0027] The clamshell portion (400) may include a first half (401) and a second half (402), wherein the first and second halves (401 and 402) are connected at a score line (403). The first half (401) may include an opening or cut out portion (404) sized and shaped to receive a blister (see blister 500 in FIG. 5). Those skilled in the art will appreciate that the clamshell portion (400) may include a number of openings (404) to accommodate multiple blister portions.

[0028] Optionally, the clamshell portion (400) may include slots (405, 406) that are positioned such that the slots (405, 406) are aligned to form a single slot (601 in FIG. 6) when the clamshell portion (400) is folded in half at the score line (403). The single slot (601) may be sized and shaped to receive a rod or peg of a display unit thereof.

[0029] FIG. 5 shows one embodiment of the blister portion (500) of the disclosed biodegradable blister package, which may include a receiving portion (501) and a flange (502). The receiving portion (501) may be sized and shaped to receive an item, such as a pharmaceutical tablet or an electronic device, therein. For example, the receiving portion (501) may be generally hemispherical in shape and may be sized to closely receive an item therein. The receiving portion (501) of the blister (500) may pass through the opening (404 in FIG. 4) in the clamshell portion (400 in FIG. 4) while the flange (502) may restrict the blister (500) from completely passing through the opening (404). For example, when the blister (500) is generally circular in top view, the flange (502) may have a greater diameter than the diameter of the opening (404) such that only the receiving portion (501) of the blister (500) passes through the opening (404).

[0030] The blister (500) may be formed from any biodegradable material. In one aspect, the blister (500) may be formed by molding polylactic acid into the desired shape. In another aspect, the blister (500) may be formed by pressing a sheet of polylactic acid over a form mold having the desired shape. In another aspect, the blister (500) may be formed by thermoforming a piece of the disclosed blister package substrate material (100), (200), or (300) into the desired shape.

[0031] FIG. 6 shows one embodiment of the biodegradable blister package of the present invention (600). The disclosed blister package (600) may be formed by positioning the receiving portion (501) of the blister (500) through the opening (404) in the clamshell portion (400), placing an item (not shown) into the receiving portion (501) and folding the clamshell portion (400) at the score line (403) such that the polylactic acid and/or adhesive layers of the first and second halves (401, 402) of the clamshell portion (400) contact each other. The coating layer (102, 207, 307), if applied, is external of the blister package (600).

[0032] The blister package 600 may be sealed by placing the folded blister package 600 between two platen and applying heat and/or pressure. However, any available sealing techniques may be used.

[0033] Although various aspects of the disclosed biodegradable blister package have been shown and described, modifications may occur to those skilled in the art upon reading the specification.

[0034] The foregoing description relates to embodiments of the present invention, but it is to be understood that changes and modifications may be made therein as will be apparent to those skilled in the art. Such variations are to be considered within the scope of the invention as defined in the following claims.

We claim:
1. A blister package, including:
(a) a blister portion comprising a biodegradable material; and
(b) a clamshell made of a substrate comprising:
(i) a layer of paperboard having a first surface and a second surface, and
(ii) a layer of polylactic acid on the first surface of the paperboard layer,
wherein the clamshell portion has a first half and a second half, and the blister portion is at least partially between the first and the second halves of the clamshell portion.

2. The blister package of claim 1, wherein the substrate comprises a member selected from the group consisting of solid bleached sulfate (SBS), coated natural kraft, folding boxboard, recycled board, unbleached board, and combinations thereof.

3. The blister package of claim 1, wherein the substrate further includes a coating layer on the second surface of the paperboard layer.

4. The blister package of claim 3, wherein the coating layer comprises a member selected from the group consisting of clay, titanium dioxide, calcium carbonate, and combinations thereof.

5. The blister package of claim 1, wherein the substrate further includes a coating layer on the layer of polylactic acid.

6. The blister package of claim 5, wherein the coating layer comprises a member selected from the group consisting of clay, titanium dioxide, calcium carbonate, and combinations thereof.

7. The blister package of claim 1, wherein the substrate further includes an adhesive layer.

8. The blister package of claim 7, wherein the adhesive layer comprises polyvinyl alcohol.

9. The blister package of claim 1, wherein the substrate further includes an adhesive layer between the first surface of the paperboard layer and the layer of polylactic acid.

10. The blister package of claim 9, wherein the adhesive layer comprises polyvinyl alcohol.

11. The blister package of claim 1, wherein the first and second halves of the clamshell portion are connected at a score line.

12. The blister package of claim 1, wherein the first and second halves of the clamshell portion include slots aligned to form a single slot when the clamshell portion is folded in half at the score line.

13. The blister package of claim 1, wherein the first half of the clamshell portion includes an opening or cut out portion to receive the blister portion therethrough.

14. The blister package of claim 1, wherein the blister portion includes a receiving portion and a flange.

15. The blister package of claim 1, wherein the biodegradable material for the blister portion includes polylactic acid.

16. The blister package of claim 1, wherein the biodegradable material for the blister portion includes a material comprising:

(i) a layer of paperboard having a first surface and a second surface, and

(ii) a layer of polylactic acid on the first surface of the paperboard layer.

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