The presently preferred embodiments relate to film structures that are exposed to focused energy to provide a score line on an internal layer of the film structure, or on both an internal layer of a film structure and an outer layer of the film structure. In addition, the present invention relates to a package that may be torn along the score line. More specifically, the package may have a score line provided on an internal layer of barrier material, such as ethylene vinyl alcohol copolymer, polyvinylidene chloride copolymer, nylon, or any other laser scorable barrier material. The score line in an internal layer and/or in the surface of the film may allow the package to be opened using tearing forces, thereby exposing a product within the package and allowing a user of the package to gain access to product that may be contained therein.
INTERNALLY SCORED FILM, PACKAGE AND METHODS OF MAKING THE SAME

FIELD OF THE INVENTION

[0001] The present invention relates to a film structure that is irradiated by a focused laser beam or other focused energy source to provide a score line on an internal layer of the film structure, or on both the internal layer of a film structure and an outer layer of the film structure. In addition, the present invention relates to a package that may be torn along the score line. More specifically, the package may have a score line provided on an internal layer of barrier material, such as ethylene vinyl alcohol copolymer, polyvinylidene chloride copolymer, nylon, blends thereof or any other laser scorable barrier polymeric material. In addition, the package may have a resealable feature to open and then reclose the package, such as, for example, a zipper or an adhesive. The score line on an internal layer and/or on the surface of the film may allow the package to be more easily opened using pull-apart forces, thereby exposing a product within the package and allowing a user of the package to gain access to product that may be contained therein.

BACKGROUND OF THE INVENTION

[0002] It is generally known to provide a line of weakness on a surface of a film structure via a focused laser beam. The focused laser beam is typically applied to the film in a first direction, such as in the machine direction of the web after extrusion or after being unwound from a roll. As a web of polymeric film, made via conventional extrusion or extrusion laminating methods, moves in the machine direction, the focused laser beam vaporizes the outer layer of the web thereby leaving a very thin line of weakness in the web material. Typically, the focused laser beam may vaporize the polymeric material of a single layer of material, such as a surface layer of the material, so that the web may be torn using digital pull-apart forces.

[0003] Many conventional polymeric materials are known to be very receptive to absorbing focused laser energy, typically focused infrared radiation. These polymeric materials include, for example, biaxially oriented polyethylene terephthalate (PET), biaxially oriented nylon (BON), nylon, paper, cellophane, polyvinylidene chloride copolymer (PVdC), or ethylene vinyl alcohol copolymer (EVOH). However, certain other thermoplastic polymers are not as susceptible to infrared laser energy at the energy level exposure of the presently preferred embodiments, such as polyolefins like low density polyethylene (LDPE) and polypropylene.

[0004] Score lines are typically applied to a film structure in a first direction, as noted above, such as in the machine direction of a web of film. However, score lines may also be applied in two different directions, such as in the machine direction of the web and the transverse direction of the web.

[0005] Typically, score lines applied to film structures useful for packages allow a user to gain access to a resealable feature disposed on the package. Reusable features are utilized on flexible plastic packaging to allow an individual to gain access to a product contained therein, and to then seal the product within the packaging for later use. For example, a resealable plastic zipper can be incorporated into the plastic packaging. The plastic zipper typically is attached on an end of the packaging and utilized to provide an opening in the end of the package. Alternatively, the plastic zipper is attached to inside surfaces of the packaging and is exposed when a portion of the plastic packaging is removed from the plastic packaging.

[0006] The flexible plastic packaging may be provided with a feature that allows the portion of the plastic packaging to be removed from the plastic packaging thereby exposing the resealable feature. This feature is typically a score line that is used to allow the portion of the plastic packaging to be removed, thereby exposing the resealable feature.

[0007] Packages are known that contain a product, such as, for example, a cheese product. A typical package consists of two flat multilayer films that are heat sealed on three sides to provide a compartment therein. For example, a single multilayer film is folded and sealed on its sides to provide the package. On the fourth side, a resealable feature is provided for opening and closing the package to add and/or remove the product from the package. The resealable feature may be a zipper that opens or closes the package when the slider is moved laterally over the open end of the package. However, the open end of the package containing the resealable feature must be initially hermetically sealed to keep and store the product that is contained therein. A typical hermetic seal is provided below the zipper, which is separated by pull-apart forces when the package is opened for the first time.

[0008] Alternatively, the zipper is provided on inside surfaces of the package. The outer surfaces of the package therefore extend over the zipper and are hermetically sealed at a position over the zipper thereby providing a sheath over the zipper. Not only does this configuration provide a hermetic seal for the package, but also the sheath further protects the zipper. To remove the sheath, straight line or patterned score lines (i.e. two dimensional, or provided in both the machine and transverse directions of the film) are provided so that the sheath can be torn and the zipper exposed.

[0009] FIG. 1 illustrates a prior art package 500 with a sheath 501 extending over a zipper 504 and having a one-dimensional score line 502 that extends horizontally across the sheath 501 at a position below the zipper 504. When the sheath 501 is torn at the score line 502, made easier by the use of a notch 506 in the side of the package 500, the zipper 504 is exposed, and the package 500 may be opened or closed by the zipper 504.

[0010] Typically, barrier materials are utilized in film structures and packages that contain products that can be damaged by oxygen, moisture or other gases. Typical barrier materials may include polyvinylidene chloride copolymer (PVdC) and ethylene vinyl alcohol copolymer (EVOH), nylon, blends thereof, or any other laser scorable barrier material known to one having ordinary skill in the art. Many of these materials have limitations, however. Polyvinylidene chloride copolymer is susceptible to yellowing during cross-linking of the films by irradiation, which also tends to break down the barrier properties of the polyvinylidene chloride. In addition, EVOH has a relatively low melting temperature, and may be damaged if extruded with polymers having relatively high temperature melting points.

5,106,562, 5,108,844, 5,190,711 and 5,236,642 and 6,500, 514, which are hereby incorporated by reference in their entireties. Various methods are disclosed for reducing the impact of higher temperature polymeric meltstream elements on a lower temperature polymeric meltstream. The methods may include super-cooling the hotter meltstream element below the melting temperature but above the crystallization temperature, exposing one or more meltstream elements to an undesirable thermal condition for a limited period of time, and/or using one or more layers as a heat sink via encapsulation.

[0012] Specifically, these patents describe methods of encapsulating one film layer by another material. The '562 and '844 patents specifically relate to PVDC or, preferably, PVdC-MA core materials with ethylene vinyl acetate copolymer (“EVA”) or ethylene methyl acrylate copolymer (“EMA”) or blend’s thereof encapsulating the core material. The encapsulated PVDC or PVdC-MA is, therefore, protected from the high temperatures of the coextrusion process. Generally, the encapsulation method uses an encapsulator having a crosshead mandrel with a central bore to receive a first meltstream element from an extruder. A second polymeric meltstream is fed through a sleeve via an inlet passage into the encapsulator. As the second meltstream enters the encapsulator, it splits and flows around the first meltstream. Consequently, the second meltstream completely surrounds the first meltstream, thereby forming a combined meltstream. The second meltstream forms a continuous layer about the circumference of the first meltstream completely surrounding the first meltstream. Thus, the first and second meltstreams maintain their individual identities while the first meltstream is completely surrounded by and encapsulated within the second meltstream. The combined meltstream may then be fed through a transport pipe to a feedback for coextrusion with one or more other layers to produce a multilayer film.

[0013] In addition, other film structures containing barrier layers may be utilized in the present invention, such as those film structures described in U.S. Pat. Nos. 6,068,933 and 09/411,671 to Shepard et al., entitled “Thermoformable Multilayer Polymeric Films”, which are expressly incorporated herein by reference. These films may include alternating layers of nylon and adhesive, with one or more layers of EVOH as internal barrier layers.

[0014] Typically, film structures having barrier materials, such as polyvinylidene chloride, ethylene vinyl and alcohol, nylon, blends thereof, or any other laser scorable barrier material which are susceptible to being vaporized by a focused laser beam, are carefully scored via the laser beam so that the barrier layers are not damaged via the focused laser beam, such that the barrier characteristics of a package made from these film structures are not affected by the scoring of the film structure. However, it has been found that laser scoring one or more internal barrier layers does not appreciably decrease the barrier properties of packages made from the films because the area of scoring is so small. Typical laser score lines are 0.003-0.006 inches thick.

[0015] If only surface layers of a film structure are scored and internal layers of film structures are left intact, it may be difficult to tear a package made from the film structure cleanly, evenly or easily. When tearing forces are applied to tear a package along a laser scored tear line wherein the surface layer is the only layer that is scored, the tensile strength of the film structure may be relatively high making it difficult to tear the package cleanly.

[0016] A need exists, therefore, for a film structure having a plurality of layers wherein an internal layer of the film structure, or both the internal layer of the film structure and an outer surface layer of the film structure is scored via a focused laser beam so the film structure may more easily be torn using tearing forces. A need further exists for internal scoring of a film structure via a focused laser beam or other focused energy source wherein the film structure is useful as a package so that the package retains or mostly retains its barrier properties and/or hermetic properties. Still further, a need exists for methods of making the film structures and packages made therefrom.

SUMMARY OF THE INVENTION

[0017] The present invention relates to flexible film structures having a plurality of layers wherein one or more of the internal layers, such as a layer of EVOH copolymer, PVDC copolymer, nylon, blends thereof, or other laser scorable barrier materials is scored via a focused laser beam or other focused energy source. Further, the present invention relates to flexible film structures having a plurality of layers wherein one or more of the internal layers and an outer surface layer of the film structure are scored via a focused laser beam or other focused energy source. In addition, the present invention relates to packages made therefrom, and methods of making the film structures.

[0018] In addition, the present invention relates to film structures containing one or more barrier layers of, preferably, ethylene vinyl alcohol copolymer, although other barrier layers are contemplated by the present invention. The film structures may be coextruded or extrusion laminated to other film layers, including an outer layer of a laser scorable polymeric material, such as PET or BON. A focused laser beam, or other focused energy source, can be applied to a film structure in a first direction, such as the machine direction, in a second direction, such as the transverse direction, or both the machine and transverse directions to provide a package having a score line on the internal barrier layer or both an internal layer and an outer layer of the film structure. Of course, film structures made with barrier layers may be made according to any method known in the art, via extrusion lamination or coextrusion, for example, such as via encapsulation as described in U.S. Pat. Nos. 5,106,562, 5,108,844, 5,190,711 and 5,236,642 and 6,500,514.

[0019] To this end, in an embodiment of the present invention, a film structure is provided having a plurality of layers wherein a first internal layer is a barrier material. The film structure has a score line on the internal layer of barrier material, and optionally includes a score line on both an internal layer of the film structure and an outer surface layer of the film structure. A preferred film structure includes a first layer of EVOH, and various other layers, in the following structure:

PET or BON/ink/LDPE/PE/lin/EVOH/lin/heat sealant

[0020] The tie layers may be any polymeric material that may be useful to bond the EVOH layers to the heat sealant layer or the layer of polyethylene. The heat sealant layer is comprised of any polymeric material useful to provide a seal when heat is applied to the film structure. Typical materials
include ethylene vinyl acetate copolymer and/or linear low density polyethylene, for example.

[0021] In an alternate embodiment of the present invention, a package is provided comprising a first side wall, a second side wall wherein the first side wall and the second side wall are bonded together on edges to form a pouch having a space therein for storing a product; a reclosable feature disposed on inside surfaces of the side walls wherein the side walls are sealed together on an end of the package; and a score line in at least one side wall from a first edge to a second edge of the at least one side wall. The package comprises an internal layer of a barrier material of EVOH copolymer. The score line may be a straight score line or may be a patterned score line, i.e., a score line disposed in both the machine and transverse directions of the film structure utilized as a package wall. The score line creates a line of weakness on the EVOH layer disposed as an internal layer in the package.

[0022] In an alternate embodiment of the present invention, a method of making a scored film wherein said score line is applied via a focused laser beam or other focused energy source on an internal layer is provided. The method includes providing a film structure having a plurality of layers wherein a first internal layer comprises a barrier material. The method further includes applying a focused laser beam or other focused energy source to the film structure wherein the focused laser beam or other focused energy source produces a line of weakness in the barrier layer. In addition, the film layer may comprise an outer layer of PET or BON that may be scored via the laser beam or other focused energy source as well.

[0023] In an alternate embodiment of the present invention, a method of making a package is provided comprising the steps of providing a first wall and a second wall; laser scoring a line of weakness in at least one side wall; providing a reclosable feature attached at a first end of the side walls; attaching the reclosable feature to inside surfaces of the side walls; and sealing the first wall and the second wall together on edges of the walls to form a pouch having a space therein for a product, wherein said score line is disposed above the reclosable feature at edges of the side walls and further wherein said score line is a straight line or traces a path to below the reclosable feature between the edges of the side walls. The package further comprises an internal layer of a barrier material. Further, the score line may create a line of weakness on the internal barrier layer.

[0024] It is, therefore, an advantage of the present invention to provide a film structure having a plurality of layers wherein one or more of the layers is an internal layer of a reclosable barrier material wherein a focused laser beam imparts a line of weakness in the internal barrier layer. The barrier properties of a package made from the film structure remain relatively unchanged after scoring the barrier layer with the focused laser beam.

[0025] In addition, it is an advantage of the present invention to provide a film structure having a plurality of layers wherein an outer layer of the film structure comprises a laser scoriable polymer such as PET or BON, and further wherein an internal layer is made from a barrier material of ethylene vinyl alcohol copolymer. A focused laser or other focused energy source applied to the film structure creates a line of weakness in both the outer layer of laser scoriable polymer and the internal layer of EVOH. The line of weakness aids in tearing the film structure when pulled apart by digital pull-apart forces.

[0026] It is further an advantage of the present invention to provide a package made from a film structure that may keep and store a product, such as a product that may have a limited shelf-life. For example, the product may be a food product, such as cheese. The package may be hermetically sealed on all sides and may further restrict the movement of moisture and/or oxygen through the walls of the package, thereby keeping the product contained therein fresh. The package may further have a score line in at least an internal layer of said film structure or on both an internal layer and an outer layer of said film structure.

[0027] Still further, it is an advantage of the present invention to provide a straight line or patterned score line on an internal layer of a film structure or on both an internal layer and an outer layer of a film structure thereby allowing a portion of the film structure to be removed by tearing forces. The removable portion may allow access to an internal space within a package made by the film structure or to expose a reclosable feature disposed on the package.

[0028] Additional features and advantages of the present invention are described in, and will be apparent from, the detailed description of the presently preferred embodiments and from the drawings.

BRIEF DESCRIPTION OF THE FIGURES

[0029] FIG. 1 illustrates a plan view of a prior art package having a zipper that does not extend to the edges of the package and a one-dimensional score line provided across the package.

[0030] FIG. 2 illustrates a cross-sectional view of a film structure having a plurality of layers wherein the film structure has a score line wherein a first outer layer is vaporized, and an internal layer of a barrier material is partially or completely vaporized.

[0031] FIG. 3 illustrates a plan view of a flexible pouch having a zipper and further having a patterned score line provided on the flexible pouch in an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

[0032] The present invention relates to a film structure that is scored by a focused laser beam or other focused energy source to provide a line of weakness or score line on an internal layer of the film structure, or on both the internal layer of a film structure and an outer layer of the film structure. In addition, the present invention relates to a package made from the film structure that may be torn along the score line. More specifically, the package may have a score line provided on an internal layer of EVOH copolymer, PVdC copolymer, nylon, blends thereof, or any other laser scoriable barrier polymeric material. In addition, the package may have a reclosable feature to open and then reseal the package, such as, for example, a zipper or an adhesive. The score line on an internal layer and/or on the surface of the film may allow the package to be opened using tearing forces, thereby exposing a product within the pack-
age and allowing a user of the package to gain access to product that may be contained therein.

[0033] Although the present description of the presently preferred embodiments describes the film layers as being “laser scorable” and that the internal layers and outer layers of the film structures are scored by a focused laser beam, it should be noted that any focused energy source that provides a score line or otherwise provides a line of weakness on an internal layer or on both an internal layer and an outer layer is contemplated by the present invention.

[0034] The present invention generally relates to a film structure having a plurality of layers, wherein a first layer comprises a laser scorable polymeric material that is disposed as an outer layer of the film structure. Said laser scorable polymeric material may include, for example, PET or BON, although any other polymeric material that is laser scorable is contemplated by the present invention. In addition, the film structure comprises an internal layer of a barrier material, such as, for example, EVOH copolymer, PVdC copolymer, nylon, blends thereof, or any other laser scorable barrier material. In addition, the film structure comprises a polymeric material that is not laser scorable with the laser beam that scores the internal layer or both the internal layer and the outer layer, such as polyolefin or the like. The non-scorable internal layer may preferably be disposed between the laser scorable internal layer and the laser scorable outer layer. Of course, however, the non-scorable internal layer may be disposed at any position within the film structure.

[0035] A film structure having an outer layer of PET or BON, or other laser scorable outer layer, and further having a barrier layer, such as a layer made from EVOH copolymer, PVdC copolymer, nylon, blends thereof, or any other laser scorable barrier material, will readily vaporize when a focused laser beam is applied to the film structure at the appropriate energy level. Specifically, a focused laser beam will vaporize most, if not all, of the outer layer of PET or BON, while not vaporizing layers of polyolefinic material, such as polyethylene or polypropylene that may be utilized as adhesive or tie layers or heat sealant layers. The barrier layer, however, may readily vaporize via the focused laser beam, and may vaporize within the film to form a bubble or void in the film structure. Typically, sufficient laser energy will vaporize up to 100% of the outer layer of laser scorable polymeric material and up to 100% of laser scorable barrier material disposed as an internal layer of the film structure. It should be noted, however, that the laser energy need not vaporize 100% of the laser scorable internal layer or 100% of either or both of the laser scorable internal layer and the laser scorable outer layer. Partial scoring of each of these layers, as well as any other laser scorable layer within the film structure, may impart sufficient weakness to provide an easily tearable film structure and, consequently, a package made therefrom.

[0036] A film having both an external score line (such as a score line within the PET or BON layer as described above) and an internal score line will have at least two layers that are weakened or scored, thereby providing lower tensile values and an easier opening package. In addition, the barrier characteristics of a package made from the film are not drastically reduced by scoring the internal layer of barrier material.

[0037] Tensile values may typically be about 7 lbs/in or greater for similar films as described above only having the outer layer of the film structure scored. However, with higher energies, scoring an internal layer can lower tensile values to 6.5 lbs/in or lower.

[0038] Focused laser energy useful for the present invention may be any apparent to one having ordinary skill in the art to score polymeric material or otherwise vaporize polymeric material. A typical laser energy source is a CO₂-based infrared energy laser having a power range of between about 10 and about 50 watts. Since typical laser beams may be split, such as by a partially reflective mirror or the like, the wattage of each focused laser beam from a single laser source that is between about 10 and 50 watts is about 5 to about 25 watts. Of course, the power level sufficient to score both the outer layer of laser scorable polymeric material and an internal barrier layer depends on a number of factors, including the proper focusing of the lens and the speed of the web. For example, web speeds may range between about 50 ft/min and about 1000 ft/min, depending on the complexity of the score line. A straight line score in the machine direction of the web may be run at relatively fast speeds. However, laser energy should be relatively high for fast web speeds. For example, if a web is moving at about 1000 ft/min, then the focused laser beam may be about 25 watts in order to score both the outer layer and the internal layer. Of course, the precise wattage necessary should be determined via experimentation.

[0039] A preferred film structure of the present invention is as follows:

48sigs PET or 60 gauge BON/tie/LDPE/PE/tie/EVOH/tie/chest weldant

[0040] Specifically, the film structure may have an outer layer of 48 gauge polyethylene terephthalate or 60 gauge biaxially oriented nylon followed by a printed layer of ink, with a layer of LDPE and another layer of PE. Next to the layer of PE is a tie layer that ties the PE layer to a layer of a barrier material comprising EVOH copolymer. A heat sealant layer is provided as a surface of the film structure wherein said heat sealant layer is bonded to said EVOH layer with another tie layer. Although the PET or BON layer is described as 48 gauge and 60 gauge, respectively, any layer thickness may be utilized and is contemplated by the present invention. In addition, the thicknesses of all layers of the present invention may be any thickness for making a film structure useful for packaging products, and which may be laser scorable.

[0041] FIG. 2 illustrates a cross-sectional view of a film structure 100 having an outer layer 102 of a laser scorable polymeric material such as PET or BON and an internal layer 104 of EVOH copolymer that has been laser scored via a focused infrared laser beam. As shown, the outer layer 102 of PET (or BON) is 100% vaporized to expose layers of polyethylene, such as low density polyethylene. The internal layer 104 of EVOH is also scored and a void is shown that pushes or bubbles toward the bottom of the film structure because of the relative thinness of the bottom of the film structure. The remaining layers, an LDPE layer 106, a PE layer 108, a tie layer 110, another tie layer 112, and a sealant layer 114, all remain intact and unscored by the focused laser beam.

[0042] Any film structure containing an internal layer of EVOH, or any other internal layer that may be laser scor-
able, may be used. For example, film structures as described in U.S. Pat. Nos. 5,106,562, 5,108,844, 5,190,711 and 5,236,642 and 6,500,514 are contemplated as being laser scorable in both an internal layer and an outer layer of the film structures described therein.

[0043] In addition, those film structures described in U.S. Pat. No. 6,068,933 and U.S. patent application Ser. No. 09/411,671 entitled “Thermoformable Multilayer Polymeric Film” may be utilized. The film structure described in U.S. Pat. No. 6,068,933 and U.S. patent application Ser. No. 09/411,671 includes seven layer film structures having alternating layers of nylon and adhesive, with an outer layer of a laser scorable polymeric material, such as nylon, and zero to one or more internal layers of EVOH. A laser beam may be applied to a film structure thereby scoring one or more internal layers of nylon, and the EVOH layers or layers, if present.

[0044] The following describes an example of a particular package that may be made from the film structures described above. Although the packages and pouches are written in terms of having a score line provided in two dimensions (i.e., the transverse and machine directions of the film structures), or otherwise having a patterned laser score, any type of score line may be provided in the film structure, such as straight score lines or patterned score lines.

[0045] Now referring to the figures, wherein like numerals refer to like parts, FIG. 3 illustrates a food pouch 1 in an embodiment of the present invention. The food pouch 1 may have two side walls 10, 12 made from melt blown biaxial film that is heat sealed together to form a space 14 wherein a food product 16, or any other product 16, may be stored. The food product may preferably be a dairy product, such as a cheese product, that may be stored within the pouch 1. The multilayer flexible film of the food pouch 1 may preferably have the following film structure:

8g PE or 8g BOW/Ink/LDPE/PE/Tie/EVOH/Tie/heat seal

[0046] The edges of the side walls 10, 12 are heat sealed together to form seals 18, 20, 22 and 24. The seals may be hermetically sealed to provide a barrier for the movement of oxygen or moisture through the edges of the pouch 1. On one end 28 of the pouch 1 may be provided a resealable feature that may preferably comprise a zipper system 30. Of course, however, other resealable features may be utilized in this invention without detracting from the present invention. The zipper system 30 may comprise a first zipper portion 32 that is bonded to an inside surface of the side wall 10. In addition, the zipper system 30 may comprise a second zipper portion 34 that is bonded to an inside surface of the side wall 12.

[0047] The first zipper portion 32 may comprise a zipper track portion 36 that is attached to a film extender 38. The film extender 38 may be attached to the inside surface of the side wall 10 at seal 40. Similarly, the second zipper portion 34 may comprise a zipper track portion 42 that is attached to a film extender 44. The film extender 44 may be attached to the inside surface of the side wall 12 at seal 46. The seals 40, 46 may extend over an entire width of the pouch 1, including within the seals 20, 24. The zipper track portions 36, 42 may be connectable together when a slider 48 is moved along tracks that may be provided on the zipper track portions 36, 42. The slider 48 may close the zipper track portions 36, 42 together to form a tight seal between the seals 20, 24.

[0048] A score line 50 is provided in at least one of the side walls 10, 12. In a preferred embodiment, the score line 50 may be provided in both of the side walls 10, 12. The score line 50 may have a first curved portion 52a that may start on an edge of the pouch 1 and be disposed above the zipper track portions 36, 42, when the pouch is oriented so that the zipper system 30 is at the top of the pouch 1. The curved portion 52a may trace a path that travels below the zipper track portions 36, 42 until the curved portion 52b meets a generally straight portion 52c that traces a path across the face of the pouch 1 until the score line 50 reaches the proximity of the other end of the pouch 1. The score line 50 then meets a second curved portion 52d that traces a path from below the zipper track portions 36, 42 to above the zipper track portions 36, 42 to the edge of the pouch 1. Of course, the score line 50 may be any shape that may be apparent to one having ordinary skill in the art including tracing a path that goes below and above the zipper track portions 36, 42 a plurality of times between the ends of the pouch 1. To facilitate the tearing of the score line 50 when digital pull-apart forces are applied, notches 54, 56 may be provided on edges of the pouch to allow a tear to form in the side walls when pulled by digital pull apart forces.

[0049] The score line 50 is provided in the side wall 10 and/or 12 so as to allow an individual to grip the end 28 of the pouch 1 and tear the end 28 from the pouch 1 along the path of the score line 50. Because the zipper track portions 36, 42 extend from one edge of the pouch 1 to the other edge of the pouch 1, the portion of the pouch 1 that is removed must clear the portions of the zipper track portions 36, 42 that are heat sealed within the heat seals 20, 24. However, the portion of the pouch 28 that is removed extends below the zipper track portions 36, 42 so as to allow an individual to have easy access to, the slider 48 to move the slider 48 back and forth along the zipper track portions 36, 42.

[0050] The score line 50 may be scored via, preferably, a laser beam, as described above. The score line has a tensile value measured across the line of weakness of between about 3 and about 10 lbs/in. In addition, and further as described above, the film structure having the score line 50 may have one or more internal barrier layers that are internally scored via the laser beam to provide a film structure having an internal score line and, optionally, a score line on both the internal layer, such as the barrier layer, and an outer layer of the film structure to decrease the tensile value of the film structure. Preferably, the film structure has a tensile value measured across the line of weakness of about 6.5 lbs/in or lower.

[0051] It should be understood that various changes and modifications to the presently preferred embodiments described herein would be apparent to those skilled in the art. Such changes and modifications may be made without departing from the spirit and scope of the present invention and without diminishing its attendant advantages. It is, therefore, intended that such changes and modifications be covered by the appended claims.

We claim:
1. A film structure comprising:
   a plurality of layers wherein a first layer disposed as an internal layer within the film structure comprises a polymeric material wherein the polymeric material is scorable by a focused energy source;
a score line disposed within the first internal layer by the focused energy source; and

a second layer of the film structure wherein the second layer is disposed between the focused energy source and the first layer when the score line is applied to the first internal layer wherein said second layer is not scored by said focused energy source.

2. The film structure of claim 1 wherein said first layer is a barrier material.

3. The film structure of claim 1 wherein said first layer comprises a polymeric material selected from the group consisting of ethylene vinyl alcohol copolymer, polyvinylidene copolymer and nylon.

4. The film structure of claim 1 wherein said score line is provided in the first layer in both the transverse and machine directions of said film structure.

5. The film structure of claim 1 wherein said score line is a straight line.

6. The film structure of claim 1 further comprising:

an outer layer comprising a polymeric material that is scorable by a focused energy source.

7. The film structure of claim 6 wherein said score line is disposed in both the first layer and the outer layer.

8. The film structure of claim 6 wherein said outer layer comprises a polymeric material selected from the group consisting of polyethylene terephthalate and biaxially oriented nylon.

9. The film structure of claim 1 further comprising:

a third layer disposed internally within the film structure comprising a polymeric material that is scorable by the focused energy source; and

a score line in said third layer.

10. The film structure of claim 9 further comprising:

an outer layer comprising a polymeric material that is scorable by the focused energy source; and

a score line in said outer layer.

11. The film structure of claim 1 wherein the focused energy source is a laser beam.

12. The film structure of claim 7 wherein said second layer is disposed between the first layer and the outer layer.

13. The film structure of claim 10 wherein said second layer is disposed between the first layer and the outer layer.

14. The film structure of claim 10 wherein said second layer is disposed between the third layer and the outer layer.

15. A package for a product comprising:

a first film structure comprising a plurality of layers wherein a first layer disposed internally within the film structure comprises a polymeric material wherein said polymeric material is scorable by a focused energy source and further wherein said film structure comprises a score line disposed within said first layer by the focused energy source and further wherein the film structure comprises a second layer that is disposed between the first layer and the focused energy source when the score line is applied to said first layer wherein said second layer is not scored by the focused energy source.

16. The package of claim 15 wherein said first layer is a barrier material.

17. The package of claim 15 wherein said first layer comprises a polymeric material selected from the group consisting of ethylene vinyl alcohol copolymer, polyvinylidene copolymer and nylon.

18. The package of claim 15 wherein said score line is provided in the first layer in both the transverse and machine directions of said film structure.

19. The package of claim 15 wherein said score line is a straight line.

20. The package of claim 15 wherein said first film structure further comprises an outer layer comprising a polymeric material that is scorable by the focused energy source.

21. The package of claim 20 wherein said score line is disposed in both the first layer and the outer layer.

22. The package of claim 20 wherein the outer layer comprises a polymeric material selected from the group consisting of polyethylene terephthalate and biaxially oriented nylon.

23. The package of claim 15 wherein the film structure further comprises a third layer disposed internally within the film structure comprising a polymeric material that is scorable by a focused energy source and a score line in said third layer.

24. The package of claim 23 wherein said film structure further comprises an outer layer comprising a polymeric material that is scorable by a focused energy source and a score line in said outer layer.

25. The package of claim 15 wherein said focused energy source is a laser beam.

26. The package of claim 21 wherein said second layer is disposed between the first layer and the outer layer.

27. The package of claim 24 wherein said second layer is disposed between the first layer and the outer layer.

28. The package of claim 24 wherein said second layer is disposed between the third layer and the outer layer.

29. The package of claim 15 further comprising:

a second film structure heat sealed to said first film structure thereby forming a cavity within the package for a product.

30. The package of claim 15 wherein said first film structure forms a first package wall and further wherein a second package wall is heat sealed to said first film structure to form a cavity within the package for a product.

31. A method of making a laser-scored film structure comprising the steps of:

providing a multilayer film structure comprising a plurality of layers wherein a first layer comprises a polymeric material wherein the polymeric material is scorable by a focused energy source;

exposing said film structure to the focused energy source;

scoring said first layer with said focused energy source;

providing a second layer disposed between the first layer and the focused energy source when the focused energy source scores the first layer; and

not scoring said second layer when said first layer is scored.

32. The method of claim 31 wherein said first layer is a barrier material.

33. The method of claim 31 wherein the first layer is a polymeric material selected from the group consisting of ethylene vinyl alcohol copolymer, polyvinylidene chloride copolymer and nylon.
34. The method of claim 31 further comprising the step of:
coextruding said plurality of layers to form said film structure.
35. The method of claim 31 further comprising the step of:
laminating said plurality of film layers to form said film structure.
36. The method of claim 31 further comprising the step of:
scoring said first layer in both the machine and transverse
directions of said film structure.
37. The method of claim 31 further comprising the step of:
providing an outer layer of said film structure wherein
said outer layer comprises a material scorable with the
focused energy source; and
scoring said outer layer with the focused energy source
when the first internal layer is scored.
38. The method of claim 31 further comprising:
providing a third layer disposed internally within said film structure wherein said third layer comprises a polymeric material that is scorable by the focused energy source; and
scoring said third layer with the focused energy source.
39. The method of claim 37 wherein said second layer is
disposed between said first layer and said outer layer.
40. The method of claim 38 wherein said second layer is
disposed between said third layer and said outer layer.
41. The method of claim 31 wherein said focused energy source comprises a laser beam.

42. A film structure comprising:
a plurality of layers wherein at least one of the plurality of layers has a score line disposed therein, wherein the film structure has a tensile strength across the score line of less than about 6.5 lb/in.
43. The film structure of claim 42 wherein the tensile value of the film structure has a tensile strength across the score line of less than about 4 lb/in.
44. The film structure of claim 42 further comprising:
an internal layer wherein the score line is disposed in the internal layer.
45. The film structure of claim 42 further comprising:
a first internal layer; and
an outer layer, wherein the score line is disposed in both the internal layer and the outer layer.
46. The film structure of claim 45 further comprising:
a second internal layer disposed between the first internal layer and the outer layer wherein said score line is not disposed within the second internal layer.
47. The film structure of claim 42 wherein said score line is disposed in said film structure via a focused energy source.
48. The film structure of claim 47 wherein said focused energy source is a focused laser beam.
49. The film structure of claim 42 wherein said film structure is between about 2 mils and about 10 mils thick.
50. The film structure of claim 42 wherein said film structure is between about 4 mils and about 8 mils thick.

* * * * *