Claims

1.

A product that includes:

a container (12; 112; 212; 312; 412; 512; 612; 712; 812; 912; 1012; 1112; 1312; 1512; 1612; 1712; 1812; 1912); and

a photochromic material carried by the container and responsive to ultraviolet (UV) light so as to darken upon exposure thereto;

characterized in that

the product also includes a UV protector carried by the container to protect the photochromic material from exposure to UV light.

2.

The product set forth in claim 1 wherein the UV protector is carried by at least one of an inside surface or outside surface of the container, or wherein at least a portion of the container itself is composed of the UV protector.

3.

The product of claim 1 including a UV light source (60; 660; 860) carried by the container.

4.

The product of claim 1 wherein the photochromic material provides an indication of package opening, and the product also includes a photothermochromic material different from the photochromic material and carried by the container to provide evidence of package tampering.

5.

The product set forth in claim 1 including a base (268) coupled to and carried by a bottom of the container and carrying the photochromic material.

6.

The product of claim 1 wherein the photochromic material is a metal halide including a metal selected from the group consisting of silver, copper, and cadmium and also including a halide selected from the group consisting of chromium, bromine, and iodine, and the product also includes a photothermochromic material different from the photochromic material and is a different metal halide including a metal selected from the group consisting of silver and gold, and also including a halide selected from the group consisting of chromium, bromine, or iodine.

7.

The product set forth in claim 1 including a separate element carried by the container and including the photochromic material, wherein the separate element is a flexible

sheet (366) carried on an inside surface of a body (316) of the container, or wherein the separate element (466a,b; 566a-c; 1066a-c; 1566a,b; 1666,b; 1866a; 1966a) is carried on a wall of the container.

8.

The product set forth in claim 1 wherein at least a portion of the container itself is composed of the photochromic material.

9.

The product set forth in claim 8 wherein the container is composed of the photochromic material and carries an external UV protective coating, or wherein the container is composed of UV protective material and carries an internal coating of the photochromic material, or wherein the container is composed of a UV protective outer layer and an inner layer of the photochromic material.

10.

The product set forth in claim 1 including an appliqué (1170) carried on the container and including the UV protector, wherein the appliqué includes a first portion (1188) and a second portion (1190) movable with respect to the first portion to expose a previously unexposed portion of the container to UV light.

11.

A package (10; 10'; 10"; 110; 210; 310; 410; 510; 710; 1310; 1410; 1810; 1910) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (13; 113; 213; 313; 413; 513; 713; 1313; 1813; 1913) coupled to the container; and

an opening indicator (14; 14'; 114; 214; 314; 714; 1314; 1414; 1814; 1914) carried by the container, and coupled to the closure and releasable therefrom upon opening of the package.

12.

The package set forth in claim 11 wherein the indicator carries the UV protector.

13.

The package set forth in claim 11 wherein the indicator is solid and is at least partially composed of the photochromic material, or wherein the indicator is hollow and is at least partially composed of the photochromic material, or wherein the indicator is hollow and carries at least one separate element (66; 1366b; 1866b; 1966b) at least partially composed of the photochromic material.

14.

The package set forth in claim 13 and including a first photosensitive portion including the photochromic material, and a second photosensitive portion (1866a; 1966a) including a photosensitive material different from the photochromic material, wherein the second photosensitive portion provides evidence of package tampering, and the first photosensitive portion provides indication of package opening.

15.

A package (10') that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (13) coupled to the container; and

a UV light source (60) coupled to a base of the container, and an opening indicator (14') electrically coupled to the UV light source and the closure to activate the UV light source upon opening of the package.

16.

A package (10") that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (13) coupled to the container; and

a UV light source (50/60) coupled to a neck (20) of the container and an opening indicator (14') electrically coupled to the UV light source and the closure to activate the UV light source upon opening of the package.

17.

A package (610; 810) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (613; 813) coupled to the container; and

a UV light source (660; 860) carried in a punt (654; 854) of the container and wherein the photochromic material is carried by a body of the container, and includes a contrast portion (662; 862) that is at least one of pre-exposed to UV light or covered with a UV protector (866), and an unexposed or uncovered portion adjacent to the contrast portion.

18.

A package (910; 1010; 1110) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container; and

a closure (913; 1013; 1113) coupled to the container,

wherein the UV protector also includes the flowable product.

19.

The package set forth in claim 18, wherein the photochromic material is carried by an elongate member (966) carried in the container, or wherein the photochromic material is carried on an exterior surface of the container and is part of one of multiple layers of different photosensitive materials having different activation modes.

20.

The package set forth in claim 19 wherein the UV protector includes a third layer including an ultraviolet protective material over the second layer.

21.

A package (10; 210; 310; 410; 610; 810) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container; and

a closure (13; 213; 313; 413; 613; 813) coupled to the container;

wherein the photochromic material includes a contrast portion (62; 262; 362; 462; 662; 862) that is at least one of pre-exposed to UV light or selectively covered with a UV protector.

22.

A method of producing a package (10; 10'; 10"; 110; 210; 310; 410; 510; 610; 710; 810; 910; 1010; 1110; 1210; 1310; 1410; 1510; 1610; 1710; 1810; 1910) that includes:

applying a photochromic material to a container (12; 112; 212; 312; 412; 512; 612; 712; 812; 912; 1012; 1112; 1312; 1512; 1612; 1712; 1812; 1912) that is responsive to ultraviolet (UV) light so as to darken upon exposure thereto;

filling the container with an original flowable product (P); and

applying a closure (13; 113; 213; 313; 413; 513; 613; 713; 813; 913; 1013; 1113; 1213; 1313; 1513; 1813; 1913) to the container,

characterized in that

the method also includes protecting, with a UV protector carried by the container, at least a portion of the photochromic material from exposure to UV light before initial opening of the package including at least one of: coating one or more surfaces of the container with a UV protectant material, composing at least a portion of the container of the UV protectant material, filling the container with the original flowable product which includes a UV absorbing product, coupling a base to the container wherein the base carries a UV protector, or coupling an opening indicator to the closure wherein the opening indicator carries a UV protector.

23.

The method set forth in claim 22 and including coupling a package opening indicator (14; 14'; 114; 214; 314; 714; 1314; 1414; 1814; 1914) to the closure before the closure is applied to the container, wherein the indicator is detachable from the closure upon removal of the closure from the container.

24.

The method set forth in claim 22 wherein the applying step includes at least one of: coating one or more surfaces of the container with the photochromic material or composing at least a portion of the container of the photochromic material.

25.

The method set forth in claim 22 wherein the protecting step includes coupling a UV protector (1214) to the closure (1213) so that removal of the closure causes removal of the UV protector.

26.

The method set forth in claim 22, and including applying a photothermochromic material to the container that is responsive to UV light exposure so as to form a latent image and responsive to subsequent heat exposure so as to darken the latent image.

Claims

1.

A product that includes:

a container (12; 112; 212; 312; 412; 512; 612; 712; 812; 912; 1012; 1112; 1312; 1512; 1612; 1712; 1812; 1912); and

a photochromic material carried by the container and responsive to ultraviolet (UV) light so as to darken upon exposure thereto to indicate use;

characterized in that

the product also includes a UV protector carried by the container to protect the photochromic material from exposure to UV light external to the container.

2.

The product set forth in claim 1 wherein the UV protector is carried by at least one of an inside surface or outside surface of the container, or wherein at least a portion of the container itself is composed of the UV protector.

3.

The product of claim 1 including a UV light source (60; 660; 860) carried by the container.

4.

The product of claim 1 wherein the photochromic material provides an indication of package opening, and the product also includes a photothermochromic material different from the photochromic material and carried by the container to provide evidence of package tampering.

5.

The product set forth in claim 1 including a base (268) coupled to and carried by a bottom of the container and carrying the photochromic material.

6.

The product of claim 1 wherein the photochromic material is a metal halide including a metal selected from the group consisting of silver, copper, and cadmium and also including a halide selected from the group consisting of chromium, bromine, and iodine, and the product also includes a photothermochromic material different from the photochromic material and is a different metal halide including a metal selected from the group consisting of silver and gold, and also including a halide selected from the group consisting of chromium, bromine, or iodine.

7.

The product set forth in claim 1 including a separate element carried by the container and including the photochromic material, wherein the separate element is a flexible

sheet (366) carried on an inside surface of a body (316) of the container, or wherein the separate element (466a,b; 566a-c; 1066a-e; 1566a,b; 1666,b; 1866a; 1966a) is carried on a wall of the container.

8.

The product set forth in claim 1 wherein at least a portion of the container itself is composed of the photochromic material.

9.

The product set forth in claim 8 wherein the container is composed of the photochromic material and carries an external UV protective coating, or wherein the container is composed of UV protective material and carries an internal coating of the photochromic material, or wherein the container is composed of a UV protective outer layer and an inner layer of the photochromic material.

10.

The product set forth in claim 1 including an appliqué (1170) carried on the container and including the UV protector, wherein the appliqué includes a first portion (1188) and a second portion (1190) movable with respect to the first portion to expose a previously unexposed portion of the container to UV light.

11.

A package (10; 10'; 10"; 110; 210; 310; 410; 510; 710; 1310; 1410; 1810; 1910) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (13; 113; 213; 313; 413; 513; 713; 1313; 1813; 1913) coupled to the container; and

an opening indicator (14; 14'; 114; 214; 314; 714; 1314; 1414; 1814; 1914) carried by the container, and coupled to the closure and releasable therefrom upon opening of the package.

12.

The package set forth in claim 11 wherein the indicator carries the UV protector.

13.

The package set forth in claim 11 wherein the indicator is solid and is at least partially composed of the photochromic material, or wherein the indicator is hollow and is at least partially composed of the photochromic material, or wherein the indicator is hollow and carries at least one separate element (66; 1366b; 1866b; 1966b) at least partially composed of the photochromic material.

14.

The package set forth in claim 13 and including a first photosensitive portion including the photochromic material, and a second photosensitive portion (1866a; 1966a) including a photosensitive material different from the photochromic material, wherein the second photosensitive portion provides evidence of package tampering, and the first photosensitive portion provides indication of package opening.

15.

A package (10') that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (13) coupled to the container; and

a UV light source (60) coupled to a base of the container, and an opening indicator (14') electrically coupled to the UV light source and the closure to activate the UV light source upon opening of the package.

16.

A package (10") that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (13) coupled to the container; and

a UV light source (50/60) coupled to a neck (20) of the container and an opening indicator (14') electrically coupled to the UV light source and the closure to activate the UV light source upon opening of the package.

17.

A package (610; 810) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container;

a closure (613; 813) coupled to the container; and

a UV light source (660; 860) carried in a punt (654; 854) of the container and wherein the photochromic material is carried by a body of the container, and includes a contrast portion (662; 862) that is at least one of pre-exposed to UV light or covered with a UV protector (866), and an unexposed or uncovered portion adjacent to the contrast portion.

18.

A package (910; 1010; 1110) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container; and

a closure (913; 1013; 1113) coupled to the container;

wherein the UV protector also includes the flowable product.

19.

The package set forth in claim 18, wherein the photochromic material is carried by an elongate member (966) carried in the container, or wherein the photochromic material is carried on an exterior surface of the container and is part of one of multiple layers of different photosensitive materials having different activation modes.

20.

The package set forth in claim 19 wherein the UV protector includes a third layer including an ultraviolet protective material over the second layer.

21.

A package (10; 210; 310; 410; 610; 810) that includes:

the product set forth in claim 1;

an original flowable product (P) dispensably disposed within the container; and

a closure (13; 213; 313; 413; 613; 813) coupled to the container;

wherein the photochromic material includes a contrast portion (62; 262; 362; 462; 662; 862) that is at least one of pre-exposed to UV light or selectively covered with a UV protector.

22.

A method of producing a package (10; 10'; 10"; 110; 210; 310; 410; 510; 610; 710; 810; 910; 1010; 1110; 1210; 1310; 1410; 1510; 1610; 1710; 1810; 1910) that includes:

applying a photochromic material to a container (12; 112; 212; 312; 412; 512; 612; 712; 812; 912; 1012; 1112; 1312; 1512; 1612; 1712; 1812; 1912) that is responsive to ultraviolet (UV) light so as to darken upon exposure thereto to indicate use;

filling the container with an original flowable product (P); and

applying a closure (13; 113; 213; 313; 413; 513; 613; 713; 813; 913; 1013; 1113; 1213; 1313; 1513; 1813; 1913) to the container,

characterized in that

the method also includes protecting, with a UV protector carried by the container, at least a portion of the photochromic material from exposure to UV light external to the container before initial opening of the package including at least one of: coating one or more surfaces of the container with a UV protectant material, composing at least a portion of the container of the UV protectant material, filling the container with the original flowable product which includes a UV absorbing product, coupling a base to the container wherein the base carries a UV protector, or coupling an opening indicator to the closure wherein the opening indicator carries a UV protector.

23.

The method set forth in claim 22 and including coupling a package opening indicator (14; 14'; 114; 214; 314; 714; 1314; 1414; 1814; 1914) to the closure before the closure is applied to the container, wherein the indicator is detachable from the closure upon removal of the closure from the container.

24.

The method set forth in claim 22 wherein the applying step includes at least one of: coating one or more surfaces of the container with the photochromic material or composing at least a portion of the container of the photochromic material.

25.

The method set forth in claim 22 wherein the protecting step includes coupling a UV protector (1214) to the closure (1213) so that removal of the closure causes removal of the UV protector.

26.

The method set forth in claim 22, and including applying a photothermochromic material to the container that is responsive to UV light exposure so as to form a latent image and responsive to subsequent heat exposure so as to darken the latent image.