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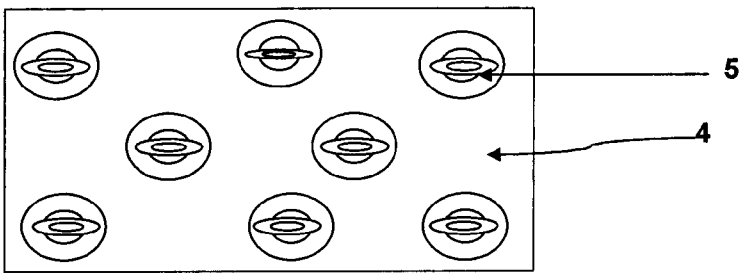
(54) **Title**: A TAMPER EVIDENT MULTIPLE METALLIZED AND DEMETALLIZED SECURITY DEVICE AND PROCESS FOR PREPARING THE SAME

FIG. 5



(57) **Abstract**: The invention provides a tamper evident multiple metallized and demetallized security device comprising a demetallized holographic transparent and/or translucent and/or opaque layer resulting from zinc sulphide (ZnS) and / or Silicon oxide (SiO) and/or magnesium fluoride (MgF_2) metallization and a holographic metallized layer with bright metallic luster obtained by aluminium (Al) and/or copper (Cu) and/or manganese (Mn) and/or silver (Ag) and/or gold (Au) and/or chromium (Cr) metallization. The device comprises embossed holographic 2D / 3D images in both the metalized and demetallized sections transmitting lights rays of multiple colour intensities. Any attempt to peel off or tampering or removal of the security device from the surface of its attachment results in separation of an outer film of the device leaving the multiple metalized and demetallized holographic film intact and bonded to the predetermined surface of its attachment.

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A tamper evident multiple metallized and demetallized security device and process for preparing the same.

Field of the invention

The invention relates to a combination tamper evident multiple metallized and demetallized security device and a process for preparing the same. More particularly, the invention relates to combination transparent and/or translucent and/or opaque multiple metallized and multiple demetallized security device which is tamper evident and any attempt to peel off or tampering or removal of the security device from the surface of its attachment results in separation of an outer film of the device leaving the multiple metallized and demetallized holographic film of the security device intact and bonded to the predetermined surface of its attachment.

Background of the invention

Counterfeiting and alteration of articles with the intent to deceive third parties is, unfortunately, a problem in society and has been prevailing for decades. Recent estimates place the total amount of counterfeit goods sold each year at more than $ 500 billion worldwide. The counterfeiting problem has become even more serious since the introduction of inexpensive, high quality color copiers, printers and scanners. These devices enable counterfeiters to reproduce the packaging and authentication features of many products

The two broad categories of items that are frequently the subject of attempted counterfeiting are documents and consumer goods. Documents may comprise identification cards, credit cards, temporary vehicle registrations, stamp papers, bank notes and placards of all kinds. Unauthorized alteration of such articles costs businesses and Governments huge amounts of money while at the same time undermining the faith of honest people in the integrity of such articles. If a document is to be protected from counterfeiting by the use of a security laminate, the laminate typically must be transparent to enable the contents of the document to be seen. The security laminate should also be difficult to copy and should be tamper evident.

Therefore, a tamper evident security device is needed which cannot be effectively duplicated and which will resist alteration. The information entered on the tamper evident security device should be destroyed upon tampering and evidence of tampering should be easily, visually detectable. The tamper evident security device should be easy to use and relatively inexpensive

As is known, holograms, kinegrams and exelgrams are currently used to provide security elements and are based on the embossing of holographic material, such as lacquers or on the embossing of various materials such as polyester, polyvinyl chloride, polypropylene and the like, with a reflective base or backing element.

The use of holograms to preserve authenticity of various articles has been known. Holograms are commonly used as authenticating devices since the hologram providing a three-dimensional image, is difficult to copy or reproduce. It is obviously important that such hologram is not easily counterfeited, photocopied, tampered or duplicated. In this direction various efforts have been made for example, computer generated 2D or 3D holograms, in true color, in multiplexes, in many levels, or holograms with covert images that are visible only under specific light or condition etc have been developed.

U.S. Patent 4,627,642 discloses a method for resisting fraudulent alteration of documents having a monetary value. A polyvinyl chloride layer has an overlying ink layer which is covered by a transparent porous varnish layer which includes a florescent powder. A filigree pattern is provided to certain portions of the ink layer and varnish layer as by silk screening and employing a second pigmented vinyl ink. It has been known to protectively laminate identification cards within transparent protective vinyl materials. See, U.S. Patent 3,582,439.

It has also been known to provide a transparent hologram which may be provided with an overlying removable support layer and underlying adhesive for securement of the hologram to an article. See U.S. Patent 4,856,857.

U.S. Patent 4,631,222 discloses a hot embossing foil which includes magnetic layer and a layer which has a structure producing a diffraction effect such as a hologram. Adhesive means may be employed to secure the element to a substrate. The backing foil is adapted to be released from the transfer layer.

U.S. Patent 4,971,646 discloses a holographic film product wherein thermoplastic adhesive is employed to secure a hologram film and metallized coating which underlies a printed layer and a protective layer of clear film.

It should also be noted that the presence of the hologram is increasingly entrusted with the feature of validating the authenticity of the item or document to which the hologram is applied or transferred; on the other hand, this fact leads to growing interest on the part of ill-intentioned individuals in trying to simulate the effect of the hologram and falsify the product.

Holographic films including metalized layers are known in the art and are utilized for a variety of applications.

Aluminized holograms came into considerable use because their authenticity may be verified without a separate verifier, but have proven to be less secure because counterfeit holograms may be made relatively easily. In the commercial product authentication area, aluminium backed holograms are becoming more popular, and may be applied to articles by sewing, gluing, molding, or the application of a tag or label.

More recently, transparent holograms have gained considerable use as security laminates because they provide transparency, they may be verified without the use of a separate instrument and they are comparatively difficult to counterfeit.

There have been many efforts to provide tamper-evident materials for application to package for pharmaceutical and food stuff products. In addition, various types of labels disintegrate or show evidence of tampering if the label is removed from the substrate.

U.S. Patent No. 5013088 discloses disintegrable masking labels which have a plurality of cuts in the label such that upon tampering, portions of the label remains bonded to the substrate and the remaining label fragments show evidence of tampering of the label.

U.S. Patent 4121003 discloses tamper indicating labels comprising a laminate of a transparent outer sheet having a tamper-indicated, information-containing pattern printed on its inner surface and a pressure sensitive adhesive film coated on the printed inner surface of the outer sheet.

U.S. Patent 4931327 discloses a tamper evident film comprising a core layer and at least one oriented tamper-evident layer applied to the core layer. The tamper-evident layer comprises a mixture of polyolefin a filler or particles which include cavitation upon orientation of the film. An oriented skin layer is applied to the core layer if tamper-evident layers have not previously been applied to both sides of the core layer.

In a tamper-evident hologram, the tamper indicating features of the article generally derive from the incorporation of a damageable layer, e.g. layer that is destructible (in whole or in part) or that is irreversible deformable. The cohesive strength of this layer is less than the adhesive strength between the component and the substrate. The article thus remains durably bonded to a substrate surface under normal use conditions. However, an attempt to forcibly remove the article from the substrate results in the cohesive or intra-layer failure of component accompanied by the separation of the component.

Therefore, the prior art discloses that aluminium metalized and demetallized holograms and tamper evident holograms have been used to overcome the problem of counterfeiting but only aluminium metalized and demetallized holograms have not been able to provide a foolproof solution to the problem of counterfeiting. Therefore, there lies an essential requirement of such a tamper evident holographic device which cannot be copied, reproduced and counterfeited and is tamper evident. A multiple metalized and demetallized tamper evident security device comprising multiple metals in the metalized and demetallized layers would be able to provide improved security and would be more helpful in overcoming the problem of counterfeiting.

Object of the invention

The primary object of the present invention is to provide a tamper evident multiple metallized and demetallized security device.

Another object of the present invention is to provide a tamper evident multiple metallized and demetallized security device comprising a holographic demetallized transparent and /or translucent and / or opaque layer resulting from zinc sulphide (ZnS) and / or Silicon oxide (SiO) and / or magnesium fluoride (MgF_2).

Another object of the present invention is to provide a tamper evident multiple metallized and demetallized security device comprising a holographic metalized layer with bright metallic luster obtained by aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and / or chromium (Cr) metals.

A further object of the invention is to provide a tamper evident multiple metalized and demetallized security device with embossed holographic images in both the metalized and demetallized sections transmitting lights rays of multiple colour intensities.

Another object of the present invention is to provide a tamper evident multiple metalized and demetallized security device comprising more than one metal present on the same planar surface in a mosaic fashion.

Another object of the present invention is to provide a tamper evident multiple metalized and demetallized security device comprising more than one metals present one-on-top of another.

Another object of the present invention is to provide a multiple metalized and demetallized security device which is tamper evident and any attempt to peel off or tampering or removal of the hologram from the surface of its attachment results in separation of an outer film of the

hologram leaving the multiple metalized and demetallized holographic film of the security device intact and bonded to the predetermined surface of its attachment.

Summary of the invention

These and other objects, features and advantages of the present invention will become more apparent upon reading the following specification in conjunction with the accompanying drawings. However, it will be understood by those skilled in the art that the foregoing general description and the following detailed description are exemplary and explanatory of the invention and are not intended to be restrictive thereof.

The present invention provides a tamper evident multiple metallized and demetallized security device and a process for preparing the same. More particularly, invention provides a tamper evident multiple metallized and demetallized seurity device comprising a demetallized holographic transparent and /or translucent and / or opaque layer resulting from zinc sulphide (ZnS) and / or Silicon oxide (SiO) and / or magnesium fluoride (MgF2) metallization and a holographic metalized layer with bright metallic luster obtained by aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and / or chromium (Cr) metallization. The tamper evident multiple metalized and demetallized security device of the invention comprises embossed holographic images in both the metalized and demetallized sections transmitting lights rays of multiple colour intensities.

In one embodiment of the invention, tamper evident multiple metalized and demetallized security device of the invention may comprise more than one metals like aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and / or chromium (Cr) present on the same planar surface in a mosaic fashion.

In another embodiment of the invention, the tamper evident multiple metalized and demetallized security device may comprise more than one metal selected from the group consisting of

aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and / or chromium (Cr) present one-on-top of another.

The multiple metalized and demetallized security device of the invention is tamper evident and any attempt to peel off or tampering or removal of the security device from the surface of its attachment results in separation of an outer film of the security device leaving the multiple metalized and demetallized holographic film of the security device intact and bonded to the predetermined surface of its attachment.

The security device of the invention comprises a biaxially oriented outer transparent or translucent film which is polyethyleneterephthalate (PET) or polyester film with a thickness in between 12 micron to 75 micron. In preferred embodiment of the invention, outer film is transparent, water resistant, has high stiffness, high tensile strength and good optics.

The outer film has an upper and a lower surface, wherein lower surface of the film is coated with a release coat. The release coat has non-adhesive properties and it is generally resistant to any type of adhesion of any material onto its surface. A second layer comprises combination of holographic multiple metalized and holographic multiple demetallized film. The demetallized layer of the security device comprises zinc sulphide (ZnS) and/or silicon oxide (SiO) and/or magnesium fluoride (MgF2) coated on the lower surface of the outer film, next to the release coat.

The metalized layer of the security device of the invention comprises aluminium (Al) and/or copper (Cu) and/or manganese (Mn) and/or silver (Ag) and /or gold (Au) and / or chromium (Cr) metal.

In one preferred embodiment of the invention, the multiple metalized and demetallized layers are present on the same planar surface, wherein various metals selected from aluminium, copper, manganese, silver, gold and chromium may be present side-by-side in patches in a mosaic

fashion on the same planar surface along with zinc sulphide or silicon oxide or magnesium fluoride.

In another embodiment of the invention, the patches of metals in metalized layer have more than one metals selected from aluminium, copper, manganese, silver, gold and chromium, present one-on-top of another, wherein the metal at the bottom has maximum surface area in a descending order while moving from bottom to top.

Both, metalized and demetallized sections of the security device have 2D and/or 3D holographic images of desired graphics or design embossed in their surface.

The second layer is bonded to a third layer of pressure sensitive adhesive. The pressure sensitive adhesive of the third layer is generally transparent or translucent and may be selected from acrylic, block copolymer rubber resin, poly (alpha) olefin and silicon pressure adhesives. The third layer of pressure sensitive adhesive is meant for coupling the second layer on a predetermined surface. The third layer is laminated on an inner transfer substrate film of release paper of varying thickness.

The outer film attached to the first surface of second layer has less cohesive strength due to releasing properties of the release coat and gets separated from the second layer in an attempt of tampering, separation or removal of the hologram from the said predetermined surface.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig 1 is a cross sectional view of the outer film having an upper surface and a lower surface.
Fig 2 is a cross sectional view of the outer film with a layer of release coat on the lower surface.
Fig 3 is cross sectional view of the security device having an outer transparent film, a second layer of combination holographic multiple metalized and demetallized film, and an inner layer of pressure sensitive adhesive.

Fig 4 is a top plan view of the security device showing holographic multiple metalized and demetallized sections on the same planar surface.

Fig 5 is a top plan view of the security device showing holographic multiple metalized and demetallized sections with more than one metal present one above another in one-on-top of other fashion.

These drawings are only indicative of the structural features of the invention and they do not reflect the actual measurements or ratio of various components / layers of the security device.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a tamper evident multiple metallized and demetallized security device and a process for preparing the same. More particularly, invention provides a tamper evident multiple metallized and demetallized security device comprising a demetallized holographic transparent and /or translucent and / or opaque layer resulting from zinc sulphide (ZnS) and / or Silicon oxide (SiO) and / or magnesium fluoride (MgF2) metallization and a holographic metalized layer with bright metallic luster obtained by aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and / or chromium (Cr) metallization. The tamper evident multiple metalized and demetallized security device of the invention comprises embossed holographic 2D / 3D images in both the metalized and demetallized sections transmitting lights rays of multiple colour intensities.

In one embodiment of the invention, tamper evident multiple metalized and demetallized security device of the invention may comprise more than one metal like aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and / or chromium (Cr) present on the same planar surface in a mosaic fashion.

In another embodiment of the invention, the tamper evident multiple metalized and demetallized security device may comprise more than one metal selected from the group consisting of

aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and / or chromium (Cr) present one-on-top of another.

The multiple metalized and demetallized security device of the invention is tamper evident and any attempt to peel off or tampering or removal of the hologram from the surface of its attachment results in separation of an outer film of the hologram leaving the multiple metalized and demetallized holographic film of the security device intact and bonded to the predetermined surface of its attachment.

Detailed embodiments of the present invention are disclosed herein with reference to the drawings. However, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which can be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure. Further, the terms and phrases used herein are not intended to be limiting but rather to provide an understandable description of the invention.

Figure 1 shows a cross sectional view of the transparent or translucent outer film (A). The outer film (A) is biaxially oriented having an upper surface 1 and a lower surface 2. The transparent or translucent outer film (A) is the outer most layer of the tamper evident holographic multiple metalized and demetallized security device of the invention. In one embodiment of the invention, the outer film (A) is polyethyleneterephthalate (PET) or polyester film. The thickness of the outer film (A) is in between 12 micron to 75 micron. The outer film (A) is generally transparent or translucent.

In a preferred embodiment of the invention, the outer film (A) is transparent, water resistant, has high stiffness, high tensile strength and good optics. The transparent or translucent outer film (A) has an upper surface (1) and a lower surface (2). The upper surface (1) and lower surface (2) of the outer film (A) are smooth and similar having no structural difference, and both of these surfaces or either of these surfaces can be coated with a release coat. Here the expression

"upper" and "lower" have been used only to bring out the clarity to a person skilled in the art and to avoid any confusion. In the preferred embodiment, only one surface, for example lower surface (2) of the film (A) is coated with a release coat (3).

Figure 2 is a cross sectional view of the outer transparent or translucent film (A) with a thin layer (B) of release coat (3) on the lower surface (2) of the outer film (A). The thickness of the release coat (3) should be sufficient to receive and hold the holographic images embossed therein. In one embodiment of the invention, the thickness of the said thin layer (B) of release coat (3) is in between 0.5micron to 2.0 micron. This thin layer of the release coat has non-adhesive properties and it is generally resistant to any type of adhesion of any material onto its surface. The release coating of the outer film (A) can be done by any conventional method. In one preferred embodiment of the present invention this coating is done by doctor blade. The coated film is dried for a sufficient time to allow the said release coat to be completely dried.

Figure 3, is cross sectional view of the security device or hologram of the invention having an outer transparent film (A), wherein the lower surface (2) of the outer transparent film (A) is coated with a release coat producing a thin layer (B) of release coat (3) on the lower surface (2) of the outer film (A). A second layer (C) is a combination of holographic multiple metalized and holographic multiple demetallized film present on the second layer (C).

The demetallized layer of the security device comprises zinc sulphide (ZnS) and/or silicon oxide (SiO) and/or magnesium fluoride (MgF_2) coated on the lower surface (2) of the outer film (A), next to the release coat (3). In one embodiment of the invention, the demetallized layer comprises zinc sulphide (ZnS). In another embodiment, the demetallized layer comprises silicon oxide (SiO). In another embodiment of the invention, the demetallized layer comprises magnesium fluoride (MgF_2).

The metalized layer of the security device of the invention comprises aluminium (Al) and/or copper (Cu) and/or manganese (Mn) and/or silver (Ag) and /or gold (Au) and / or chromium (Cr). In one embodiment of the invention, the metal layer comprises aluminium (Al). In another

embodiment of the invention the metal layer comprises copper (Cu). In another embodiment of the invention the metal layer comprises manganese (Mn). In another embodiment of the invention the metal layer comprises silver (Ag). In another embodiment of the invention the metal layer comprises gold (Au). In another embodiment of the invention, the metal layer comprises chromium (Cr).

In one preferred embodiment of the invention, the multiple metalized and demetallized layers are present on the same planar surface, wherein various metals selected from aluminium, copper, manganese, silver, gold and chromium may be present side-by-side in patches in a mosaic fashion on the same planar surface on the zinc sulphide or silicon oxide or magnesium fluoride metalized or multiple metal demetallized section (4).

In another embodiment of the invention, the patches of metals in metalized layer have more than one metal selected from aluminium, copper, manganese, silver, gold and chromium, present one-on-top of another, wherein the metal at the bottom has maximum surface area in a descending order while moving from bottom to top.

The demetallized layer comprising zinc sulphide (ZnS) and/or silicon oxide (SiO) and/or magnesium fluoride (MgF_2) is transparent and/or translucent and/or opaque.

In one preferred embodiment of the invention, this section (4) comprises zinc sulphide (ZnS) and is transparent and has high refractive index (HRI). In another embodiment of the invention the section (4) comprises silicon oxide or magnesium fluoride and is translucent or opaque.

The metalized section (5) of the second layer (C) comprises aluminium (Al) and/or copper (Cu) and/or manganese (Mn) and/or silver (Ag) and/or gold (Au) and / or chromium (Cr) and has high metallic luster.

Both, the demetallized section (4) of the security device comprising zinc sulphide (ZnS) and/or silicon oxide (SiO) and/or magnesium fluoride (MgF_2) and metalized section (5) comprising

aluminium (Al) and / or copper (Cu) and/ or manganese (Mn) and/or silver (Ag) and / or gold (Au) and/or chromium of the second layer (C) have 2D or 3D holographic images of desired graphics or design embossed in their surface.

The zinc sulphide or silicon oxide or magnesium fluoride used in the invention preferably have a purity of not less than 99.9% by weight, more preferably not less than 99.99% by weight.

The aluminium or copper or manganese or silver or gold or chromium metal used in the invention may preferably have purity not less than 99.99% by weight. In one embodiment of the invention, the combination of said zinc sulphide or silicon oxide or magnesium fluoride metalized holographic section (4) and the aluminium or copper or manganese or silver or gold or chromium metallized holographic section (5) of the second layer (C) are present in a mosaic fashion on the same planar surface of the second layer (C). The holographic images embossed in the second layer (C) may be 2D and / or 3D holographic images or graphics embossed therein.

In the preferred embodiment of the invention, the zinc sulphide or silicon oxide or magnesium fluoride metalized section (4) of the second layer (C) is aluminium or copper or manganese or silver or gold or chromium demetallized or is atleast in part demetallized. The thickness of the second layer (C) should be greater than the thickness of said embossed 2D or 3D holographic images.

In a preferred embodiment of the invention, the thickness of second layer is between 0.5 μ to 3.0 μ. The embossed holographic images of second layer (C) are obtained by hard embossing on the second layer with a shim produced by the master as per desired graphics or design. The second layer (C) has a first surface (6) which is attached to the thin layer of release coat (3) present on the lower surface (2) of the outer film (A). The second layer (C) has a second surface (7) which is bonded to the third layer (D) of pressure sensitive adhesive.

The pressure sensitive adhesive of the third layer (D) is generally transparent or translucent.

The pressure sensitive adhesive may is selected from acrylic, block copolymer rubber resin, poly (alpha) olefin and silicon pressure adhesives.

The third layer (D) of pressure sensitive adhesive is meant for coupling the second layer (C) on a predetermined surface.

The third layer (D) is laminated on an inner transfer substrate film. In a preferred embodiment of the invention, the inner substrate film is a release paper of varying thickness. The thickness of said release paper may be in between 50 GSM to 200 GSM.

In the most preferred embodiment of the invention, the outer film (A) attached to the first surface (6) of second layer (C) has less cohesive strength due to releasing properties of the release coat (3) and gets separated from the second layer (C) in an attempt of tampering, separation or removal of the security device from the said predetermined surface.

In another most preferred embodiment of the invention, the second layer (C) is bonded to the said predetermined surface with more adhesive strength than the outer film (A) is attached to the second layer(C) and therefore, the second layer (C) comprising demetallized holographic transparent and/or translucent and/or opaque section (4) and holographic aluminium and/or copper and/or manganese and/or silver and/or gold and / or chromium (Cr) metalized section (5) remains secured on the predetermined surface in an attempt to peel off or tampering or removal of the security device from the said predetermined surface resulting in separation of the said outer film (A) from the said second layer (C) leaving the combination holographic multiple metalized and demetallized holographic film of the second layer (C) intact and bonded to the predetermined surface.

Referring to figure 4 is a top plan view of the security device showing indicative representation of zinc sulphide and/or silicon oxide and/or magnesium fluoride metalized section (4) and aluminium and /or copper and/or manganese and/or silver and/or gold and/or chromium metallized sections (5) on the same planar surface of the second layer (C). The metallized and

demetallized sections may be present in a mosaic fashion on the second layer (C). Both the metalized and demetallized sections are embossed with the 2D or 3D holographic images of desired text or design. The holographic images present in the metalized and demetallized sections of the security device may have similar text or design. The holographic images in the metalized and demetallized sections may also have different graphics or design as per the desired artwork.

Referring to figure 5 is a top plan view of the hologram showing indicative representation of zinc sulphide and/or silicon oxide and/or magnesium fluoride metalized section (4) and aluminium and /or copper and/or manganese and/or silver and/or gold and/or chromium metallized sections (5), wherein the section (5) has more than one metal present one above another in one-on-top of other fashion. The sections (4) and (5) may be present in a mosaic fashion on the second layer (C). Both the sections are embossed with the 2D or 3D holographic images of desired text or design. The holographic images present in the metalized and demetallized section of the security device may have similar text or design. The holographic images in the metalized and demetallized sections may also have different graphics or design as per the artwork desired.

The tamper evident multiple metallized and demetallized security device of the present invention may be prepared by the following process.

A biaxially oriented transparent or translucent outer film (A) having an upper surface (1) and a lower surface (2) is selected from any plastic film conventionally used in the field for example polyethyleneterephthalate (PET) or polyesters and polyvinyl chloride. In the preferred embodiment of the present invention, the biaxially oriented polyethyleneterephthalate (PET) or polyester films are used. The normal thickness range of the outer film (A) may be in between 12 μ to 75 μ. In a preferred embodiment, the outer film is generally transparent, water resistant, has high stiffness, high tensile strength and good optics.

Either surface of the outer film (A) is coated with a release coat. This coating of release coat on the outer film (A) can be done by any conventional method. However, in a preferred

embodiment of the present invention, doctor blade method is preferred. The coating of the outer film with this release coat provides a thin layer (B) of release coat (3) of the order 0.5μ to 2.0 μ in thickness, with non-adhesive properties on the outer film (A), more specifically to the lower surface (2) of the outer film (A) which has been coated with the release coat. As a result of this coating, the coated surface of the outer film (A) becomes resistant to any type of adhesion of any material. In a preferred embodiment, this coating is done on lower surface (2) of the outer film (A). The coated film is dried for a sufficient time to allow the release coat to be completely dried.

The said coated first layer on the outer film (A) is then metalized with zinc sulphide or silicon oxide or magnesium fluoride. The zinc sulphide or silicon oxide or magnesium fluoride used in the invention may preferably have a purity of not less than 99.9% by weight, more preferably not less than 99.99% by weight. As a result of the zinc sulphide or silicon oxide or magnesium fluoride metallization of the film (A), a high refractive index (HRI) transparent or translucent or opaque film (4) is obtained. The zinc sulphide and/or silicon oxide and/or magnesium fluoride metallization can be done by using any conventional method including vacuum vapor-deposition method, ion-plating method, plasma method or beam method. However, in the preferred embodiment of the invention, vacuum vapor-deposition method is used.

The zinc sulphide or silicon oxide or magnesium fluoride metalized film (A) is then passed through pattern metallization. In the process of pattern metallization, the surface of the film is coated with oil, covering entire surface of the film (4) other than the predetermined design or graphics. This is also called the reverse oil coating. This coating is preferably done by gravure method. This oil coated surface of the film is then metallized with alumimium or copper or manganese or silver or gold or chromium metal using pattern metalizing. In a preferred embodiment of the invention this pattern metalizing is done by vacuum vapour-deposition method. In one of the preferred embodiments, the pattern metallization is done with metal wire. The aluminum or copper or manganese or silver or gold or chromium metal used as a source of the metallization shall preferably have a purity of not less than 99.9% by weight, more preferably

not less than 99.99% by weight. The metallic layer formed by the pattern metallization should contain the metal in an amount of 70-99% by weight, more preferably 80-95% by weight.

In the process of pattern metallization, the selected metal gets deposited on the surface of the film (4) metalized with zinc sulphide and/or silicon oxide and/or magnesium fluoride which is then passed through a wash. During washing, the metal deposited on the surface of film (4) in the area corresponding to the oil coating is washed out, whereas, the predetermined specific sections of the film (4) where the oil coating was not done, the deposited metal remains deposited on the surface.

As a result, a multiple metalized and demetallized second layer (C) of the film is obtained. In a preferred embodiment, the thickness of the second layer (C) should be greater than the depth of the embossable holographic image. Preferably the thickness should be at least 0.5 μ; more preferably in the range of 0.5 μ to 3.0 μ ; even more preferably in the range of 1.0 μ to 3.0 μ.

The film may be slitted in the desired sizes for hard embossing. The above obtained film is hard embossed with a shim produced by the master as per desired graphics or design.

The next step comprises coating the obtained holographic image embossed multiple metalized and demetallized film with a pressure sensitive adhesive forming a third layer (D) of pressure sensitive adhesive. The coating of pressure sensitive adhesive can be done by doctor blade. A further step comprises laminating the holographic film obtained in above step on an inner transfer substrate film of varying thickness and die cutting the laminate to produce the tamper evident multiple metalized and demetallized security device of the present invention.

I Claim:

1. A tamper evident multiple metalized and demetallized security device comprising an outer film (A) with a thin layer (B) of release coat (3) on the lower surface (2), a second layer (C) having demetallized (4) and metalized sections (5) and a third layer (D) of pressure sensitive adhesives bonding the second layer to a predetermined surface.

2. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said outer film (A) is biaxially oriented polyethyleneterephthalate (PET) or polyester film having thickness in between 12 microns to 75 microns.

3. A tamper evident multiple metalized and demetallized security device as claimed in claim 2, wherein said outer film (A) is transparent or translucent.

4. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein thickness of said thin layer (B) is 0.5 micron to 2.0 micron.

5. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said demetallized section (4) of the second layer (C) comprises a metalized layer of the compound selected from the group consisting of zinc sulphide (ZnS), silicon oxide (SiO) and magnesium fluoride (MgF_2).

6. A tamper evident multiple metalized and demetallized security device as claimed in claims 1or 5, wherein said demetallized section (4) has high refractive index and is transparent or translucent or opaque.

7. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said metalized section (5) of the second layer (C) comprises a metalized layer of the metals selected from the group consisting of aluminium (Al), copper (Cu), manganese (Mn), silver (Ag), gold (Au) and chromium (Cr).

8. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein the thickness of said second layer (C) is in between 0.5 micron to 3.0 micron, preferably in between 0.5 micron to 3.0 micron, more preferably in between 1.0 micron to 3.0 micron.

9. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said second layer (C) has 2D and 3D holographic designs of desired text and graphics embossed therein.

10. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said metalized (5) and demetallized (4) sections are present on the same planar surface having more than one metals selected from aluminium, copper, manganese, silver, gold and chromium, present side-by-side in patches in a mosaic fashion along with zinc sulphide or silicon oxide or magnesium fluoride, on the same planar surface.

11. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein patches of the metals in the said metalized section (5) have more than one metals selected from aluminium, copper, manganese, silver, gold and chromium (Cr), present one-on-top of another, said metal at the bottom of the patch having maximum surface area in a descending order while moving from bottom to top.

12. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said pressure sensitive adhesive of third layer (D) is selected from the group consisting of acrylic, block copolymer rubber resin, poly(alpha)olefin and silicon pressure adhesives.

13. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said outer film (A) is attached to the second layer (C) with less cohesive

strength due to releasing properties of the said release coat (3) and gets separated from the second layer (C) in an attempt of tampering, separation or removal of the security device from the said predetermined surface.

14. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said second layer is bonded to the said predetermined surface with more adhesive strength than the said outer film (A) is attached to the second layer (C), said second layer remains secured on the predetermined surface in an attempt to peel off or tampering or removal of the security device from the said predetermined surface resulting in separation of the said outer film (A) from the said second layer (C) leaving the multiple metalized and demetallized holographic film intact and bonded to the predetermined surface.

15. A tamper evident multiple metalized and demetallized security device as claimed in claim 1, wherein said security device is hologram, shrink film, self adhesive tape, holographic foil and any security device used in packaging.

16. A process for preparing tamper evident multiple metalized and demetallized security device as claimed in claim 1 comprising the steps of :

a. selecting a biaxially oriented polyethyleneterephthalate (PET) or polyester outer film (A) having an upper surface (1) and a lower surface (2);
b. coating the said lower surface (2) of the outer film (A) with a release coat to produce a thin layer (B) of release coat (3) with non-adhesive and releasing properties on the said lower surface (2) of the said outer film (A);
c. metallizing said coated lower surface with zinc sulphide or silicon oxide or magnesium fluoride to produce a transparent or translucent or opaque film;
d. reverse coating an oil on the film obtained in step (c) with pattern metalizing and washing the film to produce zinc sulphide or silicon oxide or magnesium fluoride metalized and aluminium or copper or manganese or silver or gold or chromium demetallized film;

e. obtaining the film from above step (d) and repeating the above step (d) of pattern metallization with another metal to produce more than one metal demetallized film;
f. repeating the step (d) with multiple number of metals to obtain a multiple metalized and demetallized film with desired number of metals;
g. slitting the film obtained in steps (f) in the required sizes for hard embossing;
h. embossing the film obtained in step (g) with a shim produced by the master as per desired graphics or design;
i. coating the holographic image embossed film obtained in step (h) with a pressure sensitive adhesive;
j. laminating the holographic film obtained in step (i) on a transfer substrate film of varying thickness;
k. die cutting the laminate of step (j) to produce the tamper evident multiple metalized and demetallized security device of claim 1.

17. A process as claimed in claim 16, wherein said outer film (A) is biaxially oriented polyethyleneterephthalate (PET) or polyester film having thickness in between 12 microns to 75 microns.

18. A process as claimed in claim 16, wherein said outer film (A) is transparent or translucent.

19. A process as claimed in claim 1, wherein thickness of said thin layer (B) is 0.5 micron to 2.0 micron.

20. A process as claimed in claim 16, wherein said metallization is done by vacuum vapor method.

21. A process as claimed in claim 16, wherein said release coating and adhesive coating is done by doctor blade.

FIG. 1

FIG. 2

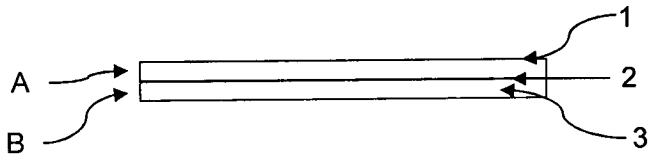

FIG. 3

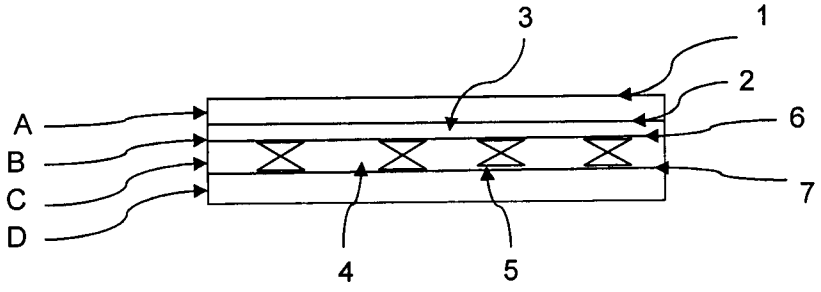

FIG. 4

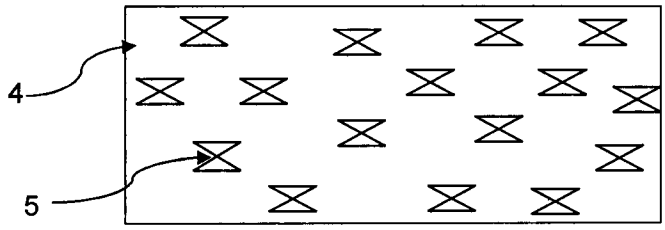

FIG. 5