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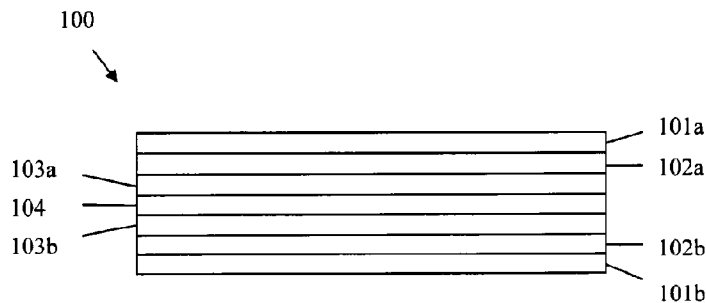


Figure 1

(57) Abstract: The present invention relates to a laminated card (100) comprising a core layer (104) of polyvinyl chloride; two adhesive layers (103a, 103b) of microporous material substrate containing a matrix of linear ultrahigh molecular weight polyolefin incorporated with siliceous filler and having a network of interconnecting pores communicated therethroughout, each layer being adhered to each surface of the core layer (104); two outer layers (102a, 102b) of polyvinyl chloride featured with personalized information, sandwiching the core layer through the adhesive layers (103a, 103b); and two protective layers (101a, 101b), each being laminated onto an external surface of each of the outer layers (102a, 102b).



A LAMINATED CARD WITH HIGH FLEXURAL STRENGTH

FIELD OF INVENTION

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The present invention relates to a laminated card for used as a data carrier. In more particular, the present invention provides a laminated card made of an innovative combination of polymeric materials that gives a relatively high flexural strength to the card, which is especially to be used as an identity card or transaction card.

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BACKGROUND OF THE INVENTION

Identity or transaction cards are usually made of polymeric or plastic materials such as polyvinyl chloride (PVC), styrene, polyethylene terephthalate (PET), glycolised polyester (PETG) or polyester film (PETF). Among all these plastic card materials, PVC card, especially laminated PVC card, is the most widely and popularly used, as it is flexible, durable, can be thermal printed or embossed with personalized information with high resolution and suitable to be embedded with barcodes. Therefore, laminated PVC is the standard card type commonly used for various financial transaction cards, including credit, debit and automatic transaction machine (ATM) cards. Apart from that, it is also generally used in the fabrication of magnetic strip cards and smart cards.

25 Styrene card is a lower cost alternative to PVC card. It has a substantially similar texture to, but less durable than the PVC card. Hence, styrene card is generally used for applications which do not require a long wallet life, for example prepaid phone cards or temporary member cards. Styrene card can be personalized by high-speed inkjet printing, resulting in a lower resolution than that of thermal printing.

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Besides, there are also PET cards, which are generally known as polyester cards, being used in the industry as a substitute to glass or aluminium sheets. PETG is used to produce environmentally friendly cards; whereas PETF is used for the production of cards requiring high thermal stability, chemical inertness and mechanical strength.

5 However, all the card materials employed in the existing technologies are relatively too high in material cost in order to be used in the manufacture of identity or transaction cards. Apart from that, these materials are also not having a high flexural strength, hence the cards manufactured therefrom are easily ruptured or delaminated when bent.

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There are a number of patented technologies in the prior art relating to identity or transaction cards made of polymeric materials. A Japanese Patent No. JP7032774 discloses an image recording medium and authentication identification card, which is made of a cured layer of an ultraviolet curable resin containing an acrylic compound and a layer made of PVC or polyurethane (PU) resin. It receives a sublimable image and forming an outermost layer of an opposite as a writable layer. It can be used for the fabrication of identification card or driving license. However, the gradation information has to be formed by a sublimation heat transfer system, whereas the character information has to be formed by a melting heat transfer system. There is no reinforcing or modifying material incorporated into the card composition to improve its flexural strength.

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A thermally stable proximity identification card is disclosed in European Patent No. EP1842689. The card includes a prelam layer of PVC and polycarbonate (PC), in which metal components such as antennas can be incorporated into the prelam layer. This invention focuses on producing a card that is having an efficient heat distribution system so as to reduce the internal stresses within the card. Nevertheless, it is also lack of any reinforcing or modifying material incorporated within the card composition to improve its flexural strength.

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A German Patent No. DE19631283 also discloses a plastic laminated card which serves as a data carrier, comprising a card core made of PVC or PET, coated with a card covering transparent film having a PU adhesive, as a watery dispersion of a polyester PU elastomer and an acrylate copolymer, with polyfunctional isocyanate crosslinking agent and a thickening agent. The drawback of the lamination of this card is the requirement of intense UV irradiation in order to obtain a good card cover. Similar to other existing technologies, there is no reinforcing or modifying material incorporated into the card composition to improve its flexural strength.

As revealed by the prior art, most of the polymeric card compositions disclosed are containing PVC, as it is the most suitable type of material used for the fabrication of data-carrying cards. Polyolefin, such as polyethylene (PE) and polypropylene (PP), which has a softer texture than that of PVC, has also been employed as one of the polymeric card materials in the industry. As described in U.S. Patent No. US5407893, the invention discloses a substrate layer and a writing layer of an identification card, wherein the substrate layer is having a polyester film and a resin of polyolefin, PVC and acrylonitrile butadiene styrene (ABS). Nevertheless, there is only a certain type of polyolefin which is able to function as reinforcing or modifying material when being incorporated into a card composition.

Another U.S. Patent No. US5478629 also provides polymeric sheets and laminas made of a blend of PVC resin, a vinyl chloride-vinyl ester copolymer, acrylic polymer, a solid tin stabilizer, waxes, as well as chlorinated polyolefin. Even though it is claimed that the polymeric sheets provided are having a high flexural durability, this polymeric sheet is more complicated in its fabrication process as it requires a blending of a wide range of materials. Besides, there is also no disclosure on the flexibility of the card fabricated.

In order to overcome the drawbacks of the existing technologies, an innovative material which can be used in the card composition as a reinforcing or modifying

material is desirable. U.S. Patent No. US4861644 discloses a printed microporous material which is made of a matrix consisting essentially of linear ultrahigh molecular weight polyolefin, a large proportion of finely divided water-soluble siliceous filler and interconnecting pores printed with printing ink. This microporous material is commercially known as TESLIN™. It is disclosed in the prior art that the TESLIN™ can serve as good printing medium, but its potential in being used as a laminated card material is yet to be discovered.

10 SUMMARY OF INVENTION

One of the objects of the present invention is to provide a laminated card for used as a data carrier, which is having a high flexural strength and tensile strength, and not easily broken or ruptured when bent.

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Another object of the present invention is to provide a laminated card using an innovative combination of polymeric materials which requires a relatively lower production or material cost yet able to give a high wallet life or durability.

20 Still another object of the present invention is to provide a laminated card which is more difficult to be delaminated, indirectly resulting in its anti-counterfeiting property.

Yet another object of the present invention is to provide a laminated card having a flexible texture which can be applied for a wide range of applications, especially for use as an identity card or transaction card.

At least one of the preceding objects is met, in whole or in part, by the present invention, in which one of the embodiments of the present invention describes a laminated card (100) comprising a core layer (104) of PVC; two adhesive layers

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(103a, 103b) of microporous material substrate containing a matrix of linear ultrahigh molecular weight polyolefin incorporated with siliceous filler and having a network of interconnecting pores communicated therethroughout, each layer being adhered to each surface of the core layer (104); two outer layers (102a, 102b) of PVC featured with personalized information, sandwiching the core layer through the adhesive layers (103a, 103b); and two protective layers (101a, 101b), each being laminated onto an external surface of each of the outer layers (102a, 102b).

One of the preferred embodiments discloses that the linear ultrahigh molecular weight polyolefin contained within the microporous material substrate is essentially linear ultrahigh molecular weight PE having an intrinsic viscosity of at least 18 deciliters/gram, essentially linear ultrahigh molecular weight PP having an intrinsic viscosity η at least 6 deciliters/gram, or a combination thereof. Preferably, the siliceous filler is finely divided particulate substantially water-soluble siliceous filler constituting from 50 % to 90 % by weight of the microporous material substrate. It is also disclosed in a preferred embodiment that the network of interconnecting pores constitutes at least 35% by volume of the microporous material substrate.

According to another preferred embodiment of the present invention, the outer layers (102a, 102b) of PVC are embedded with security code, magnetic strip or chip. Preferably, the personalized information includes identification and authentication data of a provider, a user or the combination thereof.

Still another preferred embodiment of the present invention discloses that the protective layers (101a, 101b) are transparent. Preferably, the protective layers (101a, 101b) are made of PVC.

One skilled in the art will readily appreciate that the present invention is well adapted to carry out the objects and obtain the ends and advantages mentioned, as well as those inherent therein. The embodiments described herein are not intended as

limitations on the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

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For the purpose of facilitating an understanding of the invention, there is illustrated in the accompanying drawing the preferred embodiments from an inspection of which when considered in connection with the following description, the invention, its construction and operation and many of its advantages would be readily understood and appreciated.

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Figure 1 is a cross-sectional view of the laminated card (100) as described in one of the preferred embodiments of the present invention, showing the innermost core layer (104) of PVC, adhered with two adhesive layers (103a, 103b) of microporous material substrate, which are sandwiched by two outer layers (102a, 102b) of PVC and covered by two outermost protective layers (101a, 101b).

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20 DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a laminated card for used as a data carrier. In more particular, the present invention provides a laminated card made of an innovative combination of polymeric materials that gives a relatively high flexural strength to the card, which is especially to be used as an identity card or transaction card.

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Hereinafter, the invention shall be described according to the preferred embodiments of the present invention and by referring to the accompanying description and drawings. However, it is to be understood that limiting the description to the preferred embodiments of the invention and to the drawings is merely to facilitate discussion of

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the present invention and it is envisioned that those skilled in the art may devise various modifications without departing from the scope of the appended claim.

The present invention discloses a laminated card (100) comprising a core layer (104) of PVC; two adhesive layers (103a, 103b) of microporous material substrate containing a matrix of linear ultrahigh molecular weight polyolefin incorporated with siliceous filler and having a network of interconnecting pores communicated therethroughout, each layer being adhered to each surface of the core layer (104); two outer layers (102a, 102b) of PVC featured with personalized information, sandwiching the core layer through the adhesive layers (103a, 103b); and two protective layers (101a, 101b), each being laminated onto an external surface of each of the outer layers (102a, 102b).

Figure 1 shows a cross-sectional view of the laminated card (100) having the five layers of PVC-based polymeric materials. As embodied herein, the core layer (104) of this laminated card (100) is essentially made of PVC. As laminated card made of pure PVC is generally hard in texture and easily broken or ruptured, or delaminated when bent, a reinforcing or modifying material can be incorporated into the laminated card. According to the preferred embodiment of the present invention, an innovative type of microporous material substrate is employed as the adhesive layers (103a, 103b) of the laminated card (100) in order to improve the flexural strength of the card. By having these adhesive layers laminated within the card (100), the texture and flexibility of the card (100) can be further reinforced and modified.

As described in one of the preferred embodiments of the present invention, the adhesive layers (103a, 103b) are made of microporous material substrate which contains a matrix of linear ultrahigh molecular weight polyolefin, incorporated with siliceous filler and having a network of interconnecting pores communicated throughout the entire microporous material substrate. Preferably, the linear ultrahigh molecular weight polyolefin is essentially linear ultrahigh molecular weight PE

having an intrinsic viscosity of at least 18 deciliters/gram, essentially linear ultrahigh molecular weight PP having an intrinsic viscosity of at least 6 deciliters/gram, or a combination thereof. Whilst, the siliceous filler is finely divided particulate substantially water-soluble siliceous filler constituting from 50 % to 90 % by weight of the microporous material substrate. It is also disclosed in a preferred embodiment that the network of interconnecting pores constitutes at least 35% by volume of the microporous material substrate. According to a most preferred embodiment of the present invention, the microporous material substrate can be commercially obtained under the trade name of TESLIN™, which is commonly used as a printing medium in the existing technologies. The incorporation of TESLIN™ as adhesive to laminated PVC is capable of modifying the texture of the PVC, resulting in a more flexible, softer yet durable polymeric card, which is high in tensile strength.

In accordance with another preferred embodiment of the present invention, the adhesive layers (103a, 103b), or the TESLIN™ layers are preferably present in a thickness of 100 to 200 micron, more preferably, 150 micron. The interconnecting pores within the adhesive layers (103a, 103b) allow the PVC materials to melt and fuse into the adhesive layers (103a, 103b) during the lamination process. As it is known in the art, the lamination process can be conducted through heat and pressure. The pure heat and pressure lamination is capable of ensuring the firm bonding among the polymeric materials and prevent any possible delamination. Preferably, the ratio of PVC to Teslin in the disclosed laminated card is 5-8: 1-2.5 by weight.

As shown in Figure 1, there are two outer layers (102a, 102b) of PVC, each being laminated onto the external surface of the core layer (104) through the adhesive layers (103a, 103b) to form a multilayer sandwich. These outer layers (102a, 102b) are also known as printing cores as they are featured with personalized information. Preferably, the personalized information includes identification and authentication data of a product or service provider, a user or the combination thereof. According to yet another preferred embodiment of the present invention, the personalized

information can be provided onto the card (100) through thermal printing or embossing.

As set forth in the preceding description, the laminated card (100) of the present invention is particularly applied as identity cards such as citizenship identity cards, driving licenses, student cards, member cards, business cards; or transaction cards such as credit cards, debit cards and ATM cards. Therefore, the personalized information provided on the outer layers (102a, 102b) or printing cores are usually including the name and personal information of the card holder, the card provider, or both. According to another preferred embodiment of the present invention, the outer layers (102a, 102b) can be further embedded with security code, magnetic strip or chip. These digital data carrying items are vital for both identification as well as authentication purposes of the card and the card holder. Besides, the laminated card (100) may also contain authentication logo, symbol, hologram or other graphical representations.

In accordance with still another preferred embodiment of the present invention, it is disclosed that there are two protective layers (101a, 101b) each being laminated onto an external surface of each of the outer layers (102a, 102b), and covering the outer layers (102a, 102b) together with the thermal printed or embossed information. These protective layers (101a, 101b) are capable of protecting such personalized information and further enhancing the lamination of the PVC-TESLINTM card. According to the preferred embodiment of the present invention, the protective layers (101a, 101b) are transparent, and able to provide a glossy effect to the card (100). Preferably, the protective layers (101a, 101b) are also made of PVC.

Even though the laminated card (100) of the present invention is specially invented to have a high flexural strength in order to be suitably used for the manufacture of identity or transaction cards which require a relatively longer wallet life and improved security level, it can also be used for the manufacture of other types of cards,

depending on the preference of the card providers. The laminated card (100) can also be used for manufacturing a wide variety of other card types, including discount card, gift card, prepaid phone card, prepaid transportation card, VIP card, reward card, calendar and others. Accordingly, the laminated card (100) of the present invention
5 can be manufactured into different thickness range depending on its applications. Preferably, the thickness of this laminated card (100) is in a range of 0.6 to 1.0mm, more preferably 0.76 to 0.84mm.

The present disclosure includes as contained in the appended claims, as well as that of
10 the foregoing description. Although this invention has been described in its preferred form with a degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangements of parts may be resorted to without departing from the scope of the invention.

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CLAIMS

1. A laminated card (100) comprising
a core layer (104) of polyvinyl chloride;
5 two adhesive layers (103a, 103b) of microporous material substrate containing
a matrix of linear ultrahigh molecular weight polyolefin incorporated with
siliceous filler and having a network of interconnecting pores communicated
therethroughout, each layer being adhered to each surface of the core layer
(104);
10 two outer layers (102a, 102b) of polyvinyl chloride featured with personalized
information, sandwiching the core layer through the adhesive layers (103a,
103b); and
two protective layers (101a, 101b), each being laminated onto an external
surface of each of the outer layers (102a, 102b).
15
2. A laminated card (100) according to claim 1, wherein the linear ultrahigh
molecular weight polyolefin is essentially linear ultrahigh molecular weight
polyethylene having an intrinsic viscosity of at least 18 deciliters/gram,
essentially linear ultrahigh molecular weight polypropylene having an intrinsic
20 viscosity η at least 6 deciliters/gram, or a combination thereof.
3. A laminated card (100) according to claim 1, wherein the siliceous filler is
finely divided particulate substantially water-soluble siliceous filler
constituting from 50 % to 90 % by weight of the microporous material
25 substrate.
4. A laminated card (100) according to claim 1, wherein the network of
interconnecting pores constitutes at least 35% by volume of the microporous
material substrate.
30
5. A laminated card (100) according to claim 1, wherein the outer layers (102a,

102b) is embedded with security code, magnetic strip or chip.

- 5 6. A laminated card (100) according to claim 1, wherein the personalized information includes identification and authentication data of a provider, a user or the combination thereof.
7. A laminated card (100) according to claim 1, wherein the protective layers (101a, 101b) are transparent.
- 10 8. A laminated card (100) according to claim 1, wherein the protective layers (101a, 101b) are made of polyvinyl chloride.

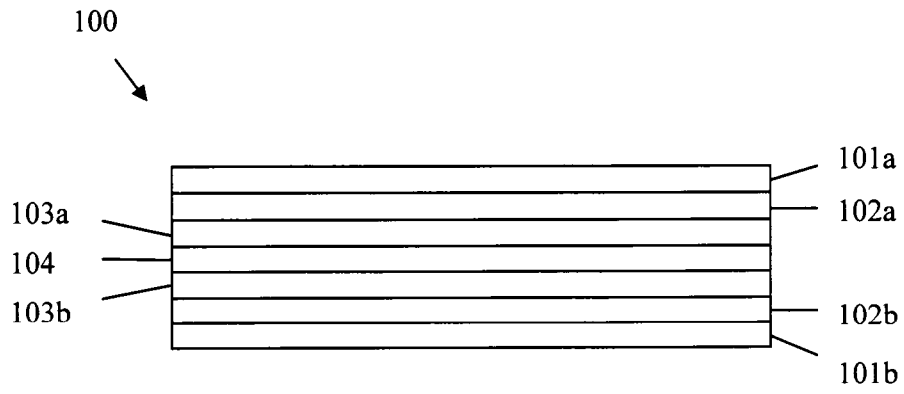


Figure 1

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

B32B 5/32 (2006.01) B32B 7/10 (2006.01) B32B 27/08 (2006.01) B32B 27/30 (2006.01) B32B 27/32 (2006.01)
B42D 25/21 (2014.01) B42D 25/23 (2014.01) B42D 25/30 (2014.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

TXTE, ESPACENET, GOOGLE PATENTS, Keywords: teslin, microporous matrix, interconnecting, pores, laminate, layer, multilayer, polyvinyl chloride, polyolefin, siliceous, silica-filled, card, identi+, security, anti_counterfeit+, financial, transaction, polyolefin, stack, adhesive, high flexural strength, B32B5/32/ic, B32B27/08/low/cn, B32B27/304/low/cn, B32B27/32/cn, B32B2425/low/cn, B32B2250/40/low/cn, B32B2250/42/low/cn, B32B2033/low/cn, B42D2033/low/cn, "two layers of teslin", "two layers of teslin separated by PVC", protect, cover, transparent, outer, two_layers, multiple layers, asia pacific card & system, high flexural strength, outer layers

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
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INTERNATIONAL SEARCH REPORT

International application No.

C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

PCT/MY2014/000197

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4892779 A (Leatherman et al.) 09 January 1990 abstract; col.1, lns 10-44; col.2, lns 3-20 and 55-60; col.12, line 52 - col.13, ln 6; col.13, lns 37-56; Examples 33-34; claims	1-8
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X	US 2011/0198837 A1 (Parrinello et al.) 18 August 2011 abstract; paragraphs 3, 7, 11-14, 19, 25, 36-37, 39-40, 56, 58	1-8
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/MY2014/000197

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex)(July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/MY2014/000197

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