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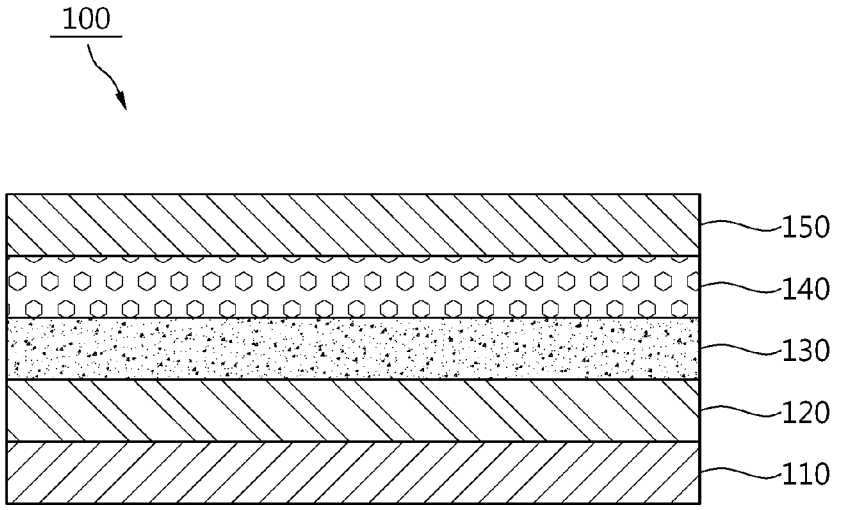
(54) Title: ABSORPTION AND DESORPTION WALLPAPER AND METHOD OF MANUFACTURING THE SAME



(57) Abstract: Disclosed herein is inorganic-substance absorption and desorption wallpaper using bio resin capable of preventing various kinds of diseases, such as a sick house syndrome, by controlling humidity using environment-friendly materials, and a method of manufacturing the same. A method of manufacturing absorption and desorption wallpaper may include forming a base layer, coating and stacking a bio resin layer over the base layer, forming an inorganic binder layer by spraying and coating an inorganic binder on the bio resin layer, forming an inorganic powder layer by scattering an inorganic substance on the inorganic binder layer, and forming a the surface protection layer over the inorganic powder layer using a wiping method.

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Description

Title of Invention: ABSORPTION AND DESORPTION WALLPAPER AND METHOD OF MANUFACTURING THE SAME

Technical Field

[1] The present invention relates to absorption and desorption wallpaper and, more particularly, to inorganic-substance absorption and desorption wallpaper using bio resin capable of preventing various kinds of diseases, such as a sick house syndrome, by controlling humidity using environment-friendly materials, and a method of manufacturing the same.

Background Art

[2] As an interest in products harmless to the human body is recently increased, an interest in groups of environment-friendly, organic farming, and pollution-free products is increased. In particular, as damage attributable to toxic substances generated from building materials is increased, an interest in building materials for preventing a so-called sick house syndrome becomes high.

[3] Wallpaper, that is, a kind of building material, has been marked as one of product groups that may provide the cause of a sick house syndrome. This increases an interest in environment-friendly wallpaper.

[4] Furthermore, to properly maintain interior temperature and humidity is one of the most basic requirements for creating a comfortable interior environment, and an importance thereof is increased according to needs to pursue the improved quality of life of modern people.

[5] However, to maintain a comfortable environment by only controlling humidity through interior ventilation is limited. Accordingly, interior humidity is controlled by attaching tiles or wallpaper having a humidity-control function to the internal wall surface of a home or building.

[6] FIG. 1 is a side-sectional view illustrating the stack structure of conventional wallpaper having a humidity-control function.

[7] Referring to FIG. 1, the conventional wallpaper 1 has a structure in which a lower non-woven fabric layer 10, an adhesive layer 20, an upper non-woven fabric layer 30, a print layer 40, an acrylic resin layer 50, and a silica layer 60 are stacked from the bottom.

[8] That is, the conventional wallpaper having such a structure is fabricated by forming the print layer on the non-woven fabric layer in which a couple of non-woven fabrics are jointed, performing embossing, coating acrylic resin on the embossed result using a

wiping method, and attaching silica having a property that repeats absorption and desorption (i.e., a humidity-control function) on the acrylic resin layer by scattering the silica on the acrylic resin layer in order to apply the humidity-control function to a common wallpaper exterior ornament effect.

[9] However, a process of manufacturing such conventional wallpaper is complicated, and a cost for the process is expensive. Furthermore, the wallpaper is problematic in that there is a possibility that various kinds of toxic substances, that is, the cause of a sick house syndrome, may be generated because the wallpaper is made of chemical substances and it is difficult to maintain interior humidity.

Disclosure of Invention

Technical Problem

[10] Accordingly, the present invention has been made in view of the above problems, and it is an object of the present invention to provide absorption and desorption wallpaper capable of implementing a comfortable interior environment and preventing various kinds of diseases, such as a sick house syndrome, by controlling humidity using environment-friendly materials, such as humidity-control materials made of bio resin and minerals, and a method of manufacturing the same.

Solution to Problem

[11] In accordance with an aspect of the present invention, absorption and desorption wallpaper is configured to include a base layer, a bio resin layer stacked over the base layer, an inorganic binder layer stacked over the bio resin layer, an inorganic powder layer stacked over the inorganic binder layer, and a surface protection layer stacked over the inorganic powder layer.

[12] In accordance with another aspect of the present invention, an absorption and desorption wallpaper is configured to include a base layer, a bio resin layer stacked over the base layer, a first inorganic binder layer stacked over the bio resin layer, a first inorganic powder layer stacked over the first inorganic binder layer, a second inorganic binder layer stacked over the first inorganic powder layer, a second inorganic powder layer stacked over the second inorganic binder layer, and a surface protection layer stacked over the second inorganic powder layer.

[13] Furthermore, the base layer is made of non-woven fabrics made of pulp and polyester, ceramic paper, or glass paper.

[14] Furthermore, the base layer has mass per unit area of 60 ~ 80 g/㎡.

[15] Furthermore, the bio resin layer is made of resin comprising one or more selected from cellulose, chitin, starch, poly lactic acid (PLA), poly hydroxyl alkanoate (PHA), hydroxy butyrate valerate (PHBV), poly vinyl alcohol (PVA), poly glycolic acid (PGA), poly butylene succinate (PBS), poly butyleneadipate-co-butylene succinate

(PBSA), polybutylene adipate terephthalate (PBAT), poly capro lactone (PCL), poly(ester-amide), and poly(ester-urethane).

[16] Furthermore, the bio resin layer is formed by mixing citric acid of 10 ~ 50 parts by weight, $CaCo_3$ of 10 ~ 150 parts by weight, acrylic copolymer of 1 ~ 10 parts by weight, and stearic acid of 1 ~ 5 parts by weight used for 100 parts by weight of PLA resin, mulling the mixture using a mulling machine at a temperature of 90 ~ 200°C, and performing calendering or an extrusion method.

[17] Furthermore, inorganic binder layer comprises mineral particles comprising one or more selected from talc, mica, clay, porous alumina, sodium silicate, and calcium silicate, and the inorganic binder layer is formed by spray coating.

[18] Furthermore, the inorganic powder layer comprises mineral particles comprising one or more selected from talc, mica, clay, porous alumina, sodium silicate, and calcium silicate, and the inorganic powder layer is formed by scattering.

[19] Furthermore, the surface protection layer is formed using acrylic resin and methylethylketone having a ratio of 2:8.

[20] In accordance with an aspect of the present invention, a method of manufacturing absorption and desorption wallpaper includes forming a base layer, coating and stacking a bio resin layer over the base layer, forming an inorganic binder layer by spraying and coating an inorganic binder on the bio resin layer, forming an inorganic powder layer by scattering an inorganic substance on the inorganic binder layer, and forming a surface protection layer over the inorganic powder layer using a wiping method.

[21] In accordance with another aspect of the present invention, a method of manufacturing absorption and desorption wallpaper includes forming a base layer, coating and stacking a bio resin layer over the base layer, forming a first inorganic binder layer by spraying and coating an inorganic binder on the bio resin layer, forming a first inorganic powder layer by scattering an inorganic substance on the first inorganic binder layer, forming a second inorganic binder layer by spraying and coating an inorganic binder on the first inorganic power layer, forming a second inorganic powder layer by scattering an inorganic substance on the second inorganic binder layer, and forming a surface protection layer on the second inorganic powder layer using a wiping method.

Advantageous Effects of Invention

[22] In accordance with the present invention, there are advantages in that humidity can be controlled, a comfortable interior environment can be implemented, and thus various kinds of diseases, such as a sick house syndrome, can be prevented because environment-friendly materials, such as humidity-control materials made of bio resin and minerals, are used.

Brief Description of Drawings

[23] FIG. 1 is a side-sectional view illustrating the stack structure of conventional wallpaper having a humidity-control function;

[24] FIG. 2 illustrates the stack structure of absorption and desorption wallpaper according to an embodiment of the present invention;

[25] FIG. 3 is a flowchart illustrating a method of manufacturing the absorption and desorption wallpaper according to an embodiment of the present invention; and

[26] FIG. 4 illustrates the stack structure of absorption and desorption wallpaper according to another embodiment of the present invention.

[27]

[28] <Description of reference numerals of principal elements in the drawings>

[29] 100: wallpaper

[30] 110: base layer

[31] 120: bio resin layer

[32] 130: inorganic binder layer

[33] 140: inorganic powder layer

[34] 150: surface protection layer

[35]

Mode for the Invention

[36] Hereinafter, the configuration and operation of the present invention according to some embodiments are described in detail below with reference to the accompanying drawings.

[37] It is to be noted that in assigning reference numerals to elements in the drawings, the same reference numerals denote the same elements throughout the drawings even in cases where the elements are shown in different drawings.

[38] FIG. 2 illustrates the stack structure of absorption and desorption wallpaper according to an embodiment of the present invention, and FIG. 3 is a flowchart illustrating a method of manufacturing the absorption and desorption wallpaper according to an embodiment of the present invention.

[39] Referring to FIG. 2, the absorption and desorption wallpaper 100 according to an embodiment of the present invention is configured to include a base layer 110, a bio resin layer 120 stacked over the base layer 110, an inorganic binder layer 130 stacked over the bio resin layer 120, an inorganic powder layer 140 stacked over the inorganic binder layer 130, and a surface protection layer 150 stacked over the inorganic powder layer 140.

[40] The structure of the absorption and desorption wallpaper 100 is described in detail below.

[41] The base layer 110 is the most basic layer that keeps the overall curling balance of the upper and lower parts of the wallpaper. The base layer 110 may be made of non-woven fabrics or cotton fabrics made of vellum paper, pulp, and polyester. Alternatively, the base layer 110 may be made of ceramic paper or glass paper capable of improving absorption and desorption efficiency of the wallpaper.

[42] In this case, the base layer 110 may have mass per unit area of 60 ~ 80 g/㎡. That is, if the base layer 110 has mass per unit area of less than 60 g/㎡, the strength of the wallpaper may not be sufficiently secured. If the base layer 110 has mass per unit area of more than 80 g/㎡, there is a problem in that cost of raw materials per unit area necessary to fabricate the wallpaper is unnecessarily increased without a change of physical properties.

[43] The bio resin layer 120 is stacked over the base layer 110. The bio resin layer 120 may be made of resin including one or more selected from cellulose, chitin, starch, poly lactic acid (PLA), poly hydroxyl alkanoate (PHA), hydroxyl butyrate valerate (PHBV), poly vinyl alcohol (PVA), poly glycolic acid (PGA), poly butylene succinate (PBS), poly butyleneadipate-co-butylene succinate (PBSA), polybutylene adipate terephthalate (PBAT), poly caprolactone (PCL), poly(ester-amide), and poly(ester-urethane).

[44] Furthermore, the bio resin layer 120 may further include a nanomineral substance of 5 to 20 parts by weight that is used for 100 parts by weight of the aforementioned resin in order to improve the heat-resisting property and web-proof property of the wallpaper and compatibility between resins. In this case, the nanomineral substance may include mica, talc, or nanoclay, but the present invention is not limited thereto.

[45] Such a nanomineral substance may have an average size of 1 ~ 100 nm. That is, if the size of the nanomineral substance is less than 1 nm, dispersibility, such as an undesirable agglomeration phenomenon occurring in the bio resin layer 120, may be deteriorated. If the size of the nanomineral substance exceeds 100 nm, the performance of the nanomineral substance may be reduced.

[46] The inorganic binder layer 130 takes advantage of the principle that an inorganic substance has the properties of adhesives due to a chemical reaction when water is mixed with the inorganic substance. Such an inorganic binder layer 130 functions as adhesives for attaching the inorganic powder layer 140, made of mineral particles, to a top surface of the bio resin layer 120. In this case, the inorganic binder layer 130 may be made of one or more selected from mineral particles, such as talc, mica, clay, porous alumina, sodium silicate, and calcium silicate.

[47] The inorganic powder layer 140 is generally stacked over the bio resin layer 120 with the inorganic binder layer 130 interposed therebetween in order to reduce interior toxic substances and smell in life and improve humidity-control efficiency of the wallpaper.

In this case, the inorganic powder layer 140 may include one or more selected from mineral particles, such as talc, mica, clay, porous alumina, sodium silicate, and calcium silicate. Such an inorganic powder layer 140 is formed using a scattering method, and may be implemented to have a nature-friendly design.

[48] The surface protection layer 150 is stacked over the inorganic powder layer 140, and has moisture permeability. The surface protection layer 150 may be formed by coating using a wiping method. In this case, the surface protection layer 150 may be formed by mixing acrylic resin and methylethylketone in the ratio of 2: 8. Such a surface protection layer 150 is formed on a top surface of the inorganic powder layer 140 made of an absorption and desorption substance using a coating processing method, thereby being capable of improving the anti-scratch property, anti-abrasion property, and durability of the wallpaper.

[49] FIG. 4 illustrates the stack structure of absorption and desorption wallpaper according to another embodiment of the present invention.

[50] Referring to FIG. 4, an absorption and desorption wallpaper 100" according to another embodiment of the present invention includes the inorganic binder layer 130 and the inorganic powder layer 140 that are repeatedly stacked on the bio resin layer 120 in order to increase the amount of a humidity-control substance and improve the absorption and desorption function.

[51] The absorption?desorption wallpaper 100 (100') according to embodiments of the present invention can control humidity and implement a comfortable interior environment because environment-friendly materials, such as bio resin and minerals, are used, and thus can prevent various kinds of diseases, such as a sick house syndrome.

[52]

[53] <Embodiment>

[54] 1. The base layer

[55] The base layer was prepared using non-woven fabrics made of pulp of 70% and polyester of 30%.

[56]

[57] 2. Forming the inorganic binder layer

[58] The inorganic binder layer was formed over the base layer using one or more selected from mineral particles, such as talc, mica, clay, porous alumina, sodium silicate, and calcium silicate.

[59]

[60] 3. Forming the bio resin layer

[61] Citric acid of 10 ~ 50 parts by weight, $CaCo_3$ of 10 ~ 150 parts by weight, acrylic copolymer of 1 ~ 10 parts by weight, and stearic acid of 1 ~5 parts by weight that were used for 100 parts by weight of the PLA resin were mixed and formed over the

adhesive layer. The mixture was mulled using a mulling machine at a temperature of 90 ~ 200℃, and the bio resin layer having a thickness of about 0.15 ㎜ was fabricated using calendering or an extrusion method.

[62]

[63] 4. Forming the surface protection layer

[64] A coating solution for surface processing was fabricated by mixing acrylic resin of 20 wt% and methylethylketone of 80 wt%. Thereafter, the surface protection layer was coated on a surface of the bio resin layer using a wiping method.

[65]

Claims

[Claim 1] Absorption and desorption wallpaper, comprising:
a base layer;
an inorganic binder layer stacked over the base layer;
a bio resin layer stacked over the adhesive layer; and
a surface protection layer stacked over the bio resin layer.

[Claim 2] Absorption and desorption wallpaper, comprising:
a base layer;
a bio resin layer stacked over the base layer;
an inorganic binder layer stacked over the bio resin layer;
an inorganic powder layer stacked over the inorganic binder layer; and
a surface protection layer stacked over the inorganic powder layer.

[Claim 3] Absorption and desorption wallpaper, comprising:
a base layer;
a bio resin layer stacked over the base layer;
a first inorganic binder layer stacked over the bio resin layer;
a first inorganic powder layer stacked over the first inorganic binder layer;
a second inorganic binder layer stacked over the first inorganic powder layer ;
a second inorganic powder layer stacked over the second inorganic binder layer again; and
a surface protection layer stacked over the second inorganic powder layer.

[Claim 4] The absorption and desorption wallpaper of any one of claims 1 to 3, wherein the base layer is made of non-woven fabrics made of pulp and polyester, ceramic paper, or glass paper.

[Claim 5] The absorption and desorption wallpaper of claim 4, wherein the base layer has mass per unit area of 60 ~ 80 g/㎡.

[Claim 6] The absorption and desorption wallpaper of any one of claims 1 to 3, wherein the bio resin layer is made of resin comprising one or more selected from cellulose, chitin, starch, poly lactic acid (PLA), poly hydroxyl alkanoate (PHA), hydroxy butyrate valerate (PHBV), poly vinyl alcohol (PVA), poly glycolic acid (PGA), poly butylene succinate (PBS), poly butyleneadipate-co-butylene succinate (PBSA), poly-butylene adipate terephthalate (PBAT), poly capro lactone (PCL), poly(ester-amide), and poly(ester-urethane).

[Claim 7] The absorption and desorption wallpaper of any one of claims 1 to 3, wherein the bio resin layer is formed by mixing citric acid of 10 ~ 50 parts by weight, $CaCo_3$ of 10 ~ 150 parts by weight, acrylic copolymer of 1 ~ 10 parts by weight, and stearic acid of 1 ~ 5 parts by weight used for 100 parts by weight of PLA resin, mulling the mixture using a mulling machine at a temperature of 90 ~ 200°C, and performing calendering or an extrusion method.

[Claim 8] The absorption and desorption wallpaper of any one of claims 1 to 3, wherein:
the inorganic binder layer or the inorganic binder layers comprises mineral particles comprising one or more selected from talc, mica, clay, porous alumina, sodium silicate, and calcium silicate, and
the inorganic binder layer is formed by spray coating.

[Claim 9] The absorption and desorption wallpaper of claim 2 or 3, wherein:
the inorganic powder layer comprises mineral particles comprising one or more selected from talc, mica, clay, porous alumina, sodium silicate, and calcium silicate, and
the inorganic powder layer is formed by scattering.

[Claim 10] The absorption and desorption wallpaper of any one of claims 1 to 3, wherein the surface protection layer is formed using acrylic resin and methylethylketone having a ratio of 2:8.

[Claim 11] The absorption and desorption wallpaper of claim 10, wherein the surface protection layer has moisture permeability and is formed by coating using a wiping method.

[Claim 12] A method of manufacturing absorption and desorption wallpaper, comprising:
forming a base layer;
coating and stacking a bio resin layer over the base layer;
forming an inorganic binder layer by spraying and coating an inorganic binder on the bio resin layer;
forming an inorganic powder layer by scattering an inorganic substance on the inorganic binder layer; and
forming a surface protection layer over the inorganic powder layer using a wiping method.

[Claim 13] A method of manufacturing absorption and desorption wallpaper, comprising:
forming a base layer;
coating and stacking a bio resin layer over the base layer;

forming a first inorganic binder layer by spraying and coating an inorganic binder on the bio resin layer;

forming a first inorganic powder layer by scattering an inorganic substance on the first inorganic binder layer;

forming a second inorganic binder layer by spraying and coating an inorganic binder on the first inorganic powder layer;

forming a second inorganic powder layer by scattering an inorganic substance on the second inorganic binder layer; and

forming a surface protection layer on the second inorganic powder layer using a wiping method.

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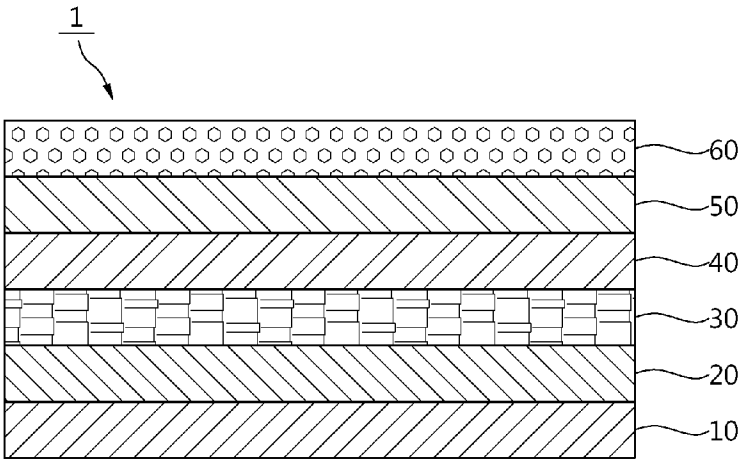
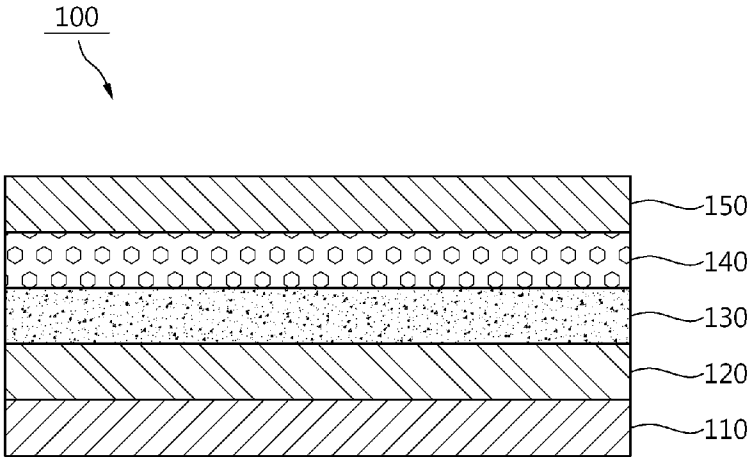
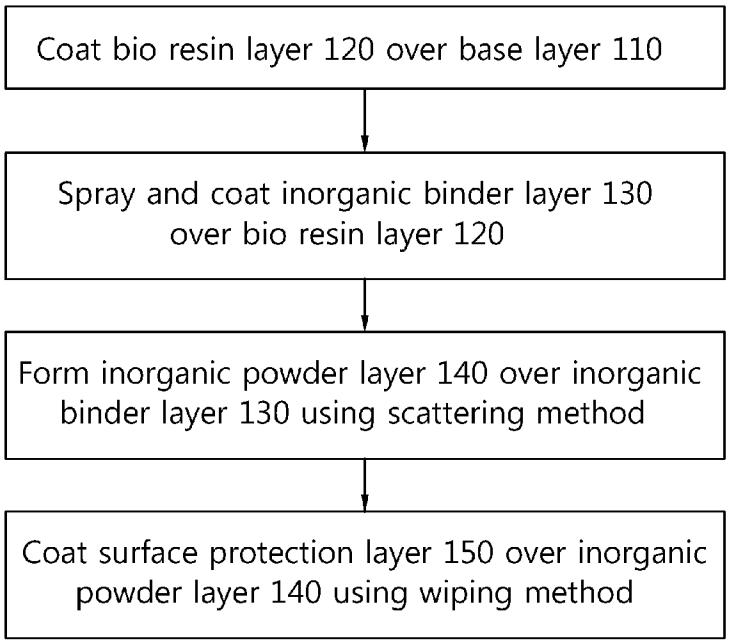
[Fig. 1]



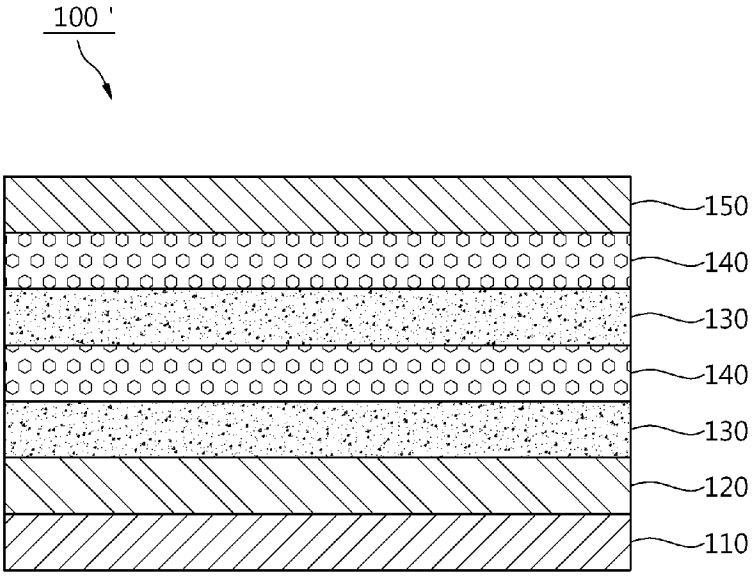
[Fig. 2]



[Fig. 3]



[Fig. 4]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2014/005463

A. CLASSIFICATION OF SUBJECT MATTER

D21H 27/20(2006.01)i, D21H 27/30(2006.01)i

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)
D21H 27/20; B32B 3/00; B32B 29/00; D21H 21/14; B05D 5/10; D21H 21/34; D21H 27/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: wall paper, biodegradable resin, layer, inorganic binder, inorganic powder, coating

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011-0217523 A1 (HUANG, C. Z. et al.) 8 September 2011 See abstract; paragraphs [0062]-[0063]; and claims 1-8, 17.	1-13
A	KR 10-2011-0072777 A (LG HAUSYS LTD.) 29 June 2011 See abstract; claim 13.	1-13
A	KR 10-2012-0035999 A (KOREA KUMHO PETROCHEMICAL CO., LTD.) 17 April 2012 See abstract; claims 1-3.	1-13
A	KR 10-0280334 B1 (PARK, M. A.) 2 May 2001 See abstract; claims 1-2; and figure 1.	1-13
A	CN 2158886 Y (ZHIJIAN, S.) 16 March 1994 See abstract; claims 1-3.	1-13

☐ 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
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 October 2014 (23.10.2014)	**24 October 2014 (24.10.2014)**

Name and mailing address of the ISA/KR
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Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR2014/005463

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