A COMPOSITION FOR LACQUERING GLASS SUBSTRATES

Technical Field

The present disclosure relates in general to a lacquer composition and more particularly to lacquer composition for glass substrates that is devoid of any organic solvent and a method of making a lacquered glass thereof.

Background

Glass lacquer compositions used, for example, for tinting glass substrates used for interior and exterior applications in buildings must be opaque, optically distortion-free, tenaciously adherent, reasonably hard and resistant to sunlight, sun heat, chemicals and moisture. Although an organic solvent-based lacquer compositions have widely been used for coating glass substrates or the like in the art, recently the use of the organic solvent-based lacquer compositions is being replaced with the use of a water-based lacquer compositions from the standpoints of atmospheric pollution and resources saving. Many solvents evaporate into what are known as volatile organic compounds, or VOCs. National, state and local governments often regulate VOCs by limiting how much businesses are allowed to emit in a given timespan, in addition to states tightening restrictions even further, necessitating efforts to limit their emissions.

Since the water-based lacquer compositions have either no, or considerably less solvents, they are a great way to lower a business's VOC output. When working in confined or poorly ventilated spaces, the evaporation of solvents can be uncomfortable for workers or even flat out hazardous to their health. Flammability is another disadvantage associated with the solvent-based lacquers in the market.

Although water-based lacquers make up about 80 percent of glass lacquer sold today in the market as reported by Paint Quality Institute, a paint advising and testing organization, they are not without their weak spots. Referring to Chinese patent number 107446487 relates to heat-preservation and thermal-insulating water-based

paint for a glass sliding door. The water-based paint composition includes resins, acrylic acid, ethers, additives, pigment, inorganic particles among other ingredients dissolved in water. Referring to Chinese application number 107189594 relates to novel water-based waterproof and heat-insulating decorative coating that comprises a resin, a waterproofing agent, a colorant, and an insulating material that are water-based. The above references prior art compositions address a very specific requirement of the paint composition used for exterior applications which is to impart insulation and waterproofing properties.

Referring to US patent number 4,255,308 relates to an aqueous dispersion lacquer composition comprising a dispersion of methyl methacrylate, an alkyl acrylate or an alkyl methacrylate and a graft copolymer comprising the above mentioned dispersions.

Thus water-based lacquer compositions are being developed to replace their solvent-based counterparts due to their advantages such as nominal cost, non inflammability, true odorlessness, and nontoxicity. Nevertheless, one cannot overlook the challenges in preparing and coating water-based lacquers. These include limited number of water soluble or water dispersible materials, susceptibility to changing weather conditions once cured on glass, slow curing times, very fair amount of mechanical stability and difficulty in producing coatings with high gloss from dispersion systems. The present disclosure discloses a glass lacquering composition that overcomes all the above mentioned disadvantages and exhibits high level of gloss, opaque and demonstrates superior resistance to humidity and temperature.

The present disclosure relates to a composition for lacquering glass substrates comprising primarily resin, filler, pigment and cross linkers that are all water-based. The composition further comprises of adhesion promoters and surfactants but is completely devoid of any organic solvents. The composition is environmental friendly and cost effective when compared to all the solvent-based lacquer compositions available in the art. Furthermore, the resin in the lacquer composition is

one of the water-soluble or water-dispersible or an emulsion that are highly cross linked and polymerized. This is advantageous by which the lacquer composition of the present disclosure is non-reactive.

Summary of the Disclosure

In one aspect of the present disclosure, a composition for lacquering glass substrates is disclosed comprising about 10 – 90% of a resin, about 2 – 40 % of filler selected from the group consisting of inorganic particles, about 2 – 50% of pigments selected from the group consisting of metal pigments or color pigments, about 1 – 30% of cross linkers selected from an amine group or an epoxy group or an acrylic group, about 0.1 – 10% of adhesion promoters and about 0.1 – 5% of surfactants dissolved in about 1 – 60% of water. The composition for lacquering glass substrates is devoid of any organic solvents.

In another aspect of the present disclosure, a method of making a lacquered glass by using the lacquer composition of the present disclosure is disclosed. The method involves the steps of cleaning a glass substrate having a first surface and a second surface, coating the lacquer composition on the first surface of the glass substrate and curing the first surface of the glass substrate coated with the lacquer composition for about 5 – 30 minutes to obtain a lacquered glass.

Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

Brief Description of the Drawings

Embodiments are illustrated by way of example and are not limited in the accompanying figures.

FIG. 1 illustrates a cross-sectional view of a lacquered glass article, in accordance with one embodiment of the present disclosure.

Skilled artisans appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of embodiments of the invention.

Detailed Description

Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or the like parts. Embodiments disclosed herein are related to a composition for lacquering glass substrates and a lacquered glass article prepared according to the teachings of the present disclosure.

FIG. 1 illustrates a cross-sectional view of a lacquered glass article 100 in accordance with one embodiment of the present disclosure. As shown, the lacquered glass article 100 includes a glass substrate 110. The glass substrate 110 is provided with a lacquer composition 200 on a first surface 101 of the glass substrate 110. In one embodiment of the present disclosure, the lacquer composition 200 can be provided on a second surface 102 of the glass substrate. The lacquer composition 200 is provided directly over the surface of the glass substrate 110 and comprises of a resin, a filler, pigments, cross linkers, adhesion promoters and surfactants mixed in water. The lacquer composition 200 of the present disclosure is devoid of any organic solvents.

In one embodiment of the present disclosure, the lacquer composition 200 is provided on the entire surface of the glass substrate 110. In a few other embodiments the lacquer composition 200 covering about 10 – 80% of the surface area of the glass substrate 110 is provided. In such an embodiment, the lacquer composition 200 may be provided in the form of a decorative pattern using screen printing techniques to obtain various shapes and sizes.

The lacquer composition 200 of the present disclosure comprises of a resin selected from the group consisting of a water-soluble resin or a water-dispersible resin or an emulsion. Such water-soluble, water-dispersible and resin emulsions are

chemically highly cross-linked and polymerized owing to which the lacquer composition 200 containing these resin is found to be non-reactive and stable. In one embodiment, the resin present in the lacquer composition 200 can be selected from the group consisting of polyurethane (PU), epoxy resin, ester resin, acrylic resin, alkyd resin, melamine resin or their combinations thereof. In one embodiment, the resin present in the lacquer composition 200 is a hybrid acrylic-urethane resin. In another embodiment, the resin present in the lacquer composition 200 is an acrylic-epoxy resin or an epoxy-ester resin. In yet another preferred embodiment, the resin present in the lacquer composition 200 is a dispersion containing polyurethane (PU) resin. The resin present in the lacquer composition 200 of the present disclosure ranges between 10 – 90% and more preferably between 40 – 80%.

The filler present in the lacquer composition 200 of the present disclosure binds to the polymeric chain of the resin and provides for re-enforcing the polymeric chains and thereby contributes to the mechanical durability of the lacquer composition 200 and as well renders the lacquer resistant to chemical and physical damages. In one embodiment of the present disclosure, the filler is an inorganic particle selected from the group consisting of glass bubble, glass flake, ceramic beads or glass microbeads. In a preferred embodiment, glass beads are used as a filler in the lacquer composition 200. In one aspect of the present embodiment, the filler constitutes about 2 – 40% of the lacquer composition 200. In another aspect of the present embodiment, the inorganic particles present in the lacquer composition have a particle size ranging between 100 nm - 20µ.

The lacquer composition 200 further contains a pigment selected from a metal pigment or an organic pigment. In one embodiment of the present disclosure, the metal pigments may include, for example, metals such as aluminum, copper, zinc, iron, tin and the like; alloys or salts of these metals and mica pigment, a shape thereof may not particularly be limited, but is suitably flaky or in powder form.

In one embodiment of the present disclosure, the color pigments may include, for example, inorganic color pigments such as titanium oxide, red oxide, yellow iron oxide, carbon black and the like; organic color pigment such as phthalocyanine blue, quinacridone red, perylene red and the like. In one aspect of the present embodiment, the pigments constitute about 2 – 50% of the lacquer composition 200. In a preferred embodiment, the concentration of the pigment is maintained between 5 – 20%. The concentration of the pigment is adjusted in such a way that the viscosity of the lacquer composition 200 does not increase during storage. This results in the lacquer composition 200 exhibiting a good color conditioning and workability. Further the lacquer composition 200 provides a finish with excellent depth of color.

The lacquer composition 200 of the present disclosure further contains cross linkers selected from an amine group or an epoxy group or an acrylic group or an isocyanate group. In another embodiment, the cross linkers may be selected from aromatic amine, aliphatic amine, cycloaliphatic amine, epoxides or urethane. The amount of the cross linker in the lacquer composition 200 is maintained between 1 – 20% and more preferably between 1 – 10%.

In yet another embodiment of the present disclosure, the lacquer composition 200 optionally contains adhesion promoters and surfactants. The adhesion promoters are selected from the group consisting of 3-glycidyloxypropyl trimethoxysilane, polymeric salt-acidic group hybrid, epoxy silane oligomer, metal chelating titanate or zirconate, γ–minopropyltriethoxysilane or vinyltrimethoxysilane. The lacquer composition 200 contains about 0.1 – 10% of adhesion promoters. The lacquer composition 200 optionally can contain surfactants selected from the group consisting of rheology modifiers, flow agents, levelling agents, de-aerators, deformers, wetting agents or dispersion agents. Commercially available rheology modifiers, flow agents, levelling agents, de-aerators, deformers, wetting agents and dispersion agents may be used in the preparation of the lacquer composition 200. However, the total

amount of surfactants present in the lacquer composition 200 is adjusted to be in the range of 0.1 – 5%.

Additionally, or optionally the lacquer composition 200 of the present disclosure may contain other components conventionally used in the preparation of water-based lacquer solutions, for example, thickening agent, surface controlling agent, anti-foaming agent, curing catalyst, extender pigment, and the like.

Unlike other lacquer solutions available in the market which are water-based but yet contain a very minimal quantity or organic solvents, the lacquer composition 200 of the present disclosure is completely devoid of any organic solvents. The various components of the lacquer composition 200 described above are dissolved in 1 – 60% of water.

The lacquer composition 200 of the present disclosure may be coated on the glass substrate 110 using conventional coating techniques such as Meyer rod coating, curtain coating, roller coating, spin coating, bar coating or spray coating. The coating is cured at about 110° to 120° C. for 5 to 30 minutes. The resulting coating is about 40 – 100 μm thick, preferably 55 - 65 μm thick, has good gloss and is opaque. The lacquer composition of the disclosure does not yellow on curing and gives a hard, durable, scratch-resistant, gasoline-resistant, weather-resistant, alkali-resistant, glossy coating which is suitable for all interior glass applications including but not limited to partitions, wall cladding and decorative purposes that necessitate having bright, opaque colors and improved aesthetics.

Examples

Example 1

Preparation of Lacquer Composition

Sample lacquer composition according to the teachings of the present disclosure were prepared using the compounds listed in Table 1. The lacquer composition was prepared by first mixing the surfactants (rheology modifiers, flow agents, levelling agents, de-aerators, deformers, wetting agents or dispersion agents) in

1 – 60% of water by stirring the solution in medium speed. The pigments are then added to the solution and stirred in high speed to facilitate good dispersion of the pigment in the solution following which the desired concentration of resin was added at slow stirring speed. The viscosity of the resultant composition was adjusted to ford cup 4 efflux time 15 – 150 seconds, more preferably between ford cup 4 efflux time 40 – 60 seconds. Thickeners were added when the resultant composition was found to be thin and running.

Table 1: Preparation of Lacquer Compositions

Components	Composition 1	Composition 2	Composition 3	Composition 4	Composition 5
Resin	PU Dispersion (76%)	Acrylic-urethane resin (76%)	Epoxy resin (50%)	Epoxy-acrylic resin (60%)	Epoxy-ester resin (75%)
Filler	Glass beads (6%)	Glass beads (6%)	Glass beads (6.5%)	Glass beads (6%)	Glass beads (7%)
Pigment	TiO_2 (15%)	TiO_2 (15%)	TiO_2 (15%)	TiO_2 (15%)	TiO_2 (15%)
Cross Linker	metal chelating titanate (1%)				
Adhesion Promoter	3-glycidyloxypropyl trimethoxysilane (1%)				
Wetting & dispersion agents	(1%)	(1%)	(1%)	(1%)	(1%)
Hardener	-	-	Epoxy hardener (25.5%)	Epoxy hardener (16%)	-

Example 2

Coating of Lacquer Composition

The surfaces of glass substrates of size 300 x 300 mm were cleaned thoroughly to remove dust, dirt and other settlements on the glass surface. The lacquer compositions prepared according to example 1 were coated on the cleaned surface of the glass substrates using a Meyer Rod (rod size wire # 80, 90). The thickness of the lacquer coating was adjusted to be between 40 – 100 µm. The lacquer coated glass substrates were then cured in an oven at a temperature ranging between 110 - 120°C for about 10 – 25 minutes. The lacquered glass substrates were found to be completely cured at the end of the curing step. The lacquer compositions were found to have formed an opaque, glossy, bright, uniform and continuous coating.

Example 3

Optical & Mechanical Properties Testing of Lacquered Glass Substrates

The mechanical properties such as hardness, adhesion strength and scratch resistance of the lacquer compositions shown in example 1 coated on the surface of the glass substrates were tested. Opacity studies, cross cut test (ISO 2409 standard) and visible scratch test (EN 438 standard) were carried out. These experiments were conducted to test the mechanical and optical durability of the lacquered glass substrates of the present disclosure in comparison with a conventional lacquered glass sample available in the market.

Though the mechanical studies carried out showed similar results for samples prepared by the teaching of the present disclosure and the market sample, the sample prepared by the present disclosure showed a significantly high performance in visible scratch test.

The visible scratch resistance is an important criterion for lacquered glass substrates. This visible scratch resistance provides mechanical resistance against scratches that can appear during cutting and edge grinding of glass that result in chipping off of edges and also against rough handling of samples.

The high mechanical resistance reported by the sample prepared using the present disclosure could be attributed to the lacquer composition comprising resins that are highly cross linked and polymerized. On the other hand, the market sample showed a relatively lower performance which could be attributed to the presence of organic solvents and less cross linking resins.

Table 2: Mechanical Testing – Results

Tests	Sample 1	Sample 2	Sample 3	Market Sample
Opacity (ΔE*) (contrast card)	0.39	0.23	1.57	0.12
Color Value (ΔE*)	0.37	1.01	2.69	0.19
Cross cut	0 – 1	0 – 1	0	0
Visible scratch (g)	>400	<150	>400	350

Sample 1, 2 and 3 provided with the lacquer composition 1, 2 and 3 were seen to have significant mechanical durability compared to the market samples. This better performance of these samples is attributed to the high degree of cross linking seen in the resins present in the lacquer composition. While samples 1 has good opacity and color value, samples 2 and 3 did not record desired opacity and color values.

Example 4

Durability Testing of Lacquered Glass Substrates

The lacquered glass substrates prepared according to the teachings of the present disclosure were subjected to high humidity testing and high temperature testing. To understand the effect of high humidity on the lacquer coating, the lacquered glass samples were placed in a humidity chamber at 50° C, 95% RH for 21 days,

followed by comparison of optical characterization of the samples before and after high humidity testing.

To understand the effect of high temperature on the lacquer coating, the lacquered glass samples were placed in an oven at 50 °C for a period of 21 days. The results of the above tests are illustrated in Table 3. The ΔE of the lacquer compositions in both the tests were found to be below 0.5.

Table 3: Durability Testing – Results

Tests	Sample 1	Sample 2	Market Sample
High Humidity Testing (ΔE)	0.26 No major surface defects were observed	0.95 Tiny blisters were observed	0.39
High Temperature Testing (ΔE)	0.24	0.49	0.12

Example 5

Gloss Measurements

The gloss value of the lacquered glass substrates prepared according to the present disclosure was measured using a gloss meter with R 60◦ angle and the values are shown in table 4.

Table 4: Gloss Value of Lacquered Glass Substrates

Tests	Sample 1	Sample 2	Sample 3	Market Sample

Average gloss on lacquered surface (R 60°)	73	53	100	73

Sample 3 of present disclosure was found to have more gloss than the market sample. Again the choice of resin for preparing the lacquer composition of the present disclosure contributes to the gloss value.

Thus the lacquered glass article 100 of the present disclosure is very unique with significantly high mechanical & optical properties, durability performance, significant gloss value and is more cost-effective (almost 50% cost reduction) than commercially available lacquered glass products.

Industrial Application

The lacquer composition 200 described in the present disclosure is devoid of any organic solvents. Owing to which the lacquer composition 200 reduces unpleasant and pungent smell arising from the use of organic solvents. In the contrary, water based lacquer compositions of the present disclosure contain water dispersible or emulsified resins that have very low or nil volatile organic compounds (VOC) and hence are very user friendly to be used in closed spaces like office and residential homes.

Further the use of water dispersible or emulsified resins considerable reduces the cost of the lacquer composition of the present disclosure compared to the organic solvent-based lacquer available in the market. Furthermore, the lacquer composition 200 of the present disclosure showed equal performance and properties and in few tests such as visible scratch improved performance when compared to the conventional lacquer available in the market taken as a standard. The lacquered glass article 100 according to this disclosure may have various applications. The lacquered

glass article 100 may, for example be used for various interior applications of buildings including but not limited to wardrobes, as doors for furniture, as partitions, in tables, shelves, in bathrooms, in shops displays, as wall covering or as spandrels. Such lacquered glass article 100 may also be used for decorative purposes as not limiting to a wall mount in office spaces, lift lobbies, receptions, kitchens, bathrooms and could also be possibly used as dinning and coffee table surfaces. More and more of these applications necessitate the glass article to be resistant to scratches, color fading/ bleaching, humidity exposure, moisture exposure and peeling of the lacquer layer.

Installation of the lacquered glass article 100 of the present disclosure in such applications achieve both aesthetic appeal and functional performance. The utilization of the lacquer composition of the present disclosure facilitates robustness against handling and storage degradation, and enhances flexibility for transportation in the as-coated state.

The present disclosure also relates to a method of making the lacquered glass article 100. The method comprises of steps 310 to 330. In multiple embodiments of the present disclosure, the lacquered glass article 100 illustrated in **FIG. 1** may be obtained by performing the steps of the method.

In step 310, the glass substrate is first cleaned thoroughly by a mixture of ceria and calcium carbonate powders with the help of rotating brush. The air side of the glass substrate was cleaned. Following which, the cleaned glass substrate was dried thoroughly by compressed air flow knife. The surface was then silane treated. In step 320, desired viscosity and thixotropy of the lacquer composition was obtained by adding appropriate concentration of the various components of the lacquer composition. The lacquer composition was then applied on the surface of the glass substrate using a Meyer Rod technique.

Various patterns including dots, rectangular bars etc. of varying diameters and depths were created on the surface of the glass substrate. The thickness of the lacquer coating was controlled to be not more than 100 µm by using different

rod size and moderating the coating parameters. The surface area to be covered by the lacquer composition of the present disclosure is varied based on the requirement. In one embodiment, the lacquer layer is coated to cover a surface area ranging between 10% and 80%. In the final step 330, the lacquered glass substrate was cured. The lacquered glass substrate was passed through a continuous convective IR oven with temperatures ranging between 110 °C and 120 °C. Residence time in the oven was between 5 minutes to 30 minutes. In alternate embodiments of the present disclosure, other drying techniques including thermal oven, heat combustion, UV curing can also be used.

Following lacquer coating and drying, the fillers present in the lacquer composition of the present disclosure thermally cured and binds with the glass substrate to provide green strength to the glass substrate. As a result, the enamel coated glass substrate can withstand subsequent transportation, washing (if needed). Further the lacquer coating does not yellow during the curing process and results in a hard, durable, scratch-resistant, gasoline-resistant, weather-resistant, alkali-resistant, acid-resistant, glossy coating.

Note that not all of the activities described above in the general description or the examples are required, that a portion of a specific activity may not be required, and that one or more further activities may be performed in addition to those described. Still further, the order in which activities are listed is not necessarily the order in which they are performed.

Benefits, other advantages, and solutions to problems have been described above with regard to specific embodiments. However, the benefits, advantages, solutions to problems, and any feature(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential feature of any or all the claims.

The specification and illustrations of the embodiments described herein are intended to provide a general understanding of the structure of the various

embodiments. The specification and illustrations are not intended to serve as an exhaustive and comprehensive description of all of the elements and features of apparatus and systems that use the structures or methods described herein. Certain features, that are for clarity, described herein in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features that are, for brevity, described in the context of a single embodiment, may also be provided separately or in a sub combination. Further, reference to values stated in ranges includes each and every value within that range. Many other embodiments may be apparent to skilled artisans only after reading this specification. Other embodiments may be used and derived from the disclosure, such that a structural substitution, logical substitution, or another change may be made without departing from the scope of the disclosure. Accordingly, the disclosure is to be regarded as illustrative rather than restrictive.

The description in combination with the figures is provided to assist in understanding the teachings disclosed herein, is provided to assist in describing the teachings, and should not be interpreted as a limitation on the scope or applicability of the teachings. However, other teachings can certainly be used in this application.

As used herein, the terms "comprises," "comprising," "includes," "including," "has," "having" or any other variation thereof, are intended to cover a non-exclusive inclusion. For example, a method, article, or apparatus that comprises a list of features is not necessarily limited only to those features but may include other features not expressly listed or inherent to such method, article, or apparatus. Further, unless expressly stated to the contrary, "or" refers to an inclusive-or and not to an exclusive-or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

Also, the use of "a" or "an" is employed to describe elements and components described herein. This is done merely for convenience and to give a

general sense of the scope of the invention. This description should be read to include one or at least one and the singular also includes the plural, or vice versa, unless it is clear that it is meant otherwise. For example, when a single item is described herein, more than one item may be used in place of a single item. Similarly, where more than one item is described herein, a single item may be substituted for that more than one item.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The materials, methods, and examples are illustrative only and not intended to be limiting. To the extent that certain details regarding specific materials and processing acts are not described, such details may include conventional approaches, which may be found in reference books and other sources within the manufacturing arts.

While aspects of the present disclosure have been particularly shown and described with reference to the embodiments above, it will be understood by those skilled in the art that various additional embodiments may be contemplated by the modification of the disclosed machines, systems and methods without departing from the spirit and scope of what is disclosed. Such embodiments should be understood to fall within the scope of the present disclosure as determined based upon the claims and any equivalents thereof.

List of Elements

TITLE: A COMPOSITION FOR LACQUERING GLASS SUBSTRATES

100	Lacquered Glass Article
101	First Surface
102	Second Surface
110	Glass substrate
200	Lacquer Composition
300	Method
310	Step
320	Step
330	Step

Claims

We Claim:

1) A composition for lacquering glass substrates comprising:

about 10 – 90% of a resin;

about 2 – 40 % of filler selected from the group consisting of inorganic particles;

about 2 – 50% of pigments selected from the group consisting of metal pigments or color pigments;

about 1 – 20% of cross linkers selected from an amine group or an epoxy group or an acrylic group;

about 0.1 – 10% of adhesion promoters; and

about 0.1 – 5% of surfactants dissolved in about 1 – 60% of water, wherein the said composition is devoid of any organic solvents.

2) The composition as claimed in claim 1, wherein the resin is a water-soluble resin or a water-dispersible resin or an emulsion.

3) The composition as claimed in claim 1, wherein the resin is a dispersion or an emulsion or a suspension containing polyurethane, epoxy resin, ester resin, acrylic resin, alkyd resin, melamine resin or their combinations thereof.

4) The composition as claimed in claim 1, wherein the filler is selected from the group consisting of glass bubble, glass flake, ceramic beads or glass microbeads.

5) The composition as claimed in claim 1, wherein the metal pigments or color pigments are selected from the group consisting of ZnS, ZnO, $BaSO_4$, $Zn_3(PO_4)_2$, FeO, phthalocyanine, carbon black, aluminum powder, ammonium manganese (III) pyrophosphate, cobalt violet, cobalt blue, chrome yellow or chrome green.

6) The composition as claimed in claim 1, wherein the cross linkers are selected from the group consisting of aromatic amine, aliphatic amine, cycloaliphatic amine, epoxides or urethane.

7) The composition as claimed in claim 1, wherein the adhesion promoters are selected from the group consisting of 3-glycidyloxypropyl trimethoxysilane, polymeric salt-acidic group hybrid, epoxy silane oligomer, metal chelating titanate or zirconate, γ–minopropyltriethoxysilane or vinyltrimethoxysilane.

8) The composition as claimed in claim 1, wherein the surfactants are selected from the group consisting of rheology modifiers, flow agents, levelling agents, de-aerators, deformers, wetting agents or dispersion agents.

9) The composition as claimed in claim 1 is opaque and has gloss values ranging between 10 – 100 R-60°.

10) A method of making a lacquered glass comprising the steps of:

cleaning a glass substrate having a first surface and a second surface;

coating the lacquer composition as claimed in claim 1 on the first surface of the glass substrate; and

curing the first surface of the glass substrate coated with the lacquer composition for about 5 – 30 minutes to obtain a lacquered glass.

11) The method as claimed in claim 10, wherein step of coating the lacquer composition is done by Meyer rod coating, curtain coating, roller coating, spin coating, bar coating or spray coating.

12) The method as claimed in claim 10, wherein the thickness of the lacquer composition ranges between 40 – 100 µm.

13) The method as claimed in claim 10, wherein the viscosity of the lacquer composition ranges between ford cup 4 efflux time 15-150 seconds.

14) A lacquered glass article comprising the composition for lacquering as claimed in claim 1.

15) The lacquered glass as claimed in claim 14 wherein the composition of lacquering covers about 10 – 80% of the surface area of the glass article.

16) The lacquered glass as claimed in claim 14 wherein the composition of lacquering covers the entire surface area of the glass article.

Abstract of the Disclosure

A COMPOSITION FOR LACQUERING GLASS SUBSTRATES

A composition for lacquering glass substrates is provided. The composition of lacquering comprises of about 10 – 90% of a resin, about 2 – 40 % of filler selected from the group consisting of inorganic particles, about 2 – 50% of pigments selected from the group consisting of metal pigments or color pigments, about 1 – 30% of cross linkers selected from an amine group or an epoxy group or an acrylic group, about 0.1 – 10% of adhesion promoters and about 0.1 – 5% of surfactants dissolved in about 1 – 60% of water. The composition for lacquering glass substrates is devoid of any organic solvents. The present disclosure further relates to a method of making a lacquered glass article using the lacquer composition. The lacquered glass article prepared according to the present disclosure has a gloss value ranging between 10 – 100 R-60°.

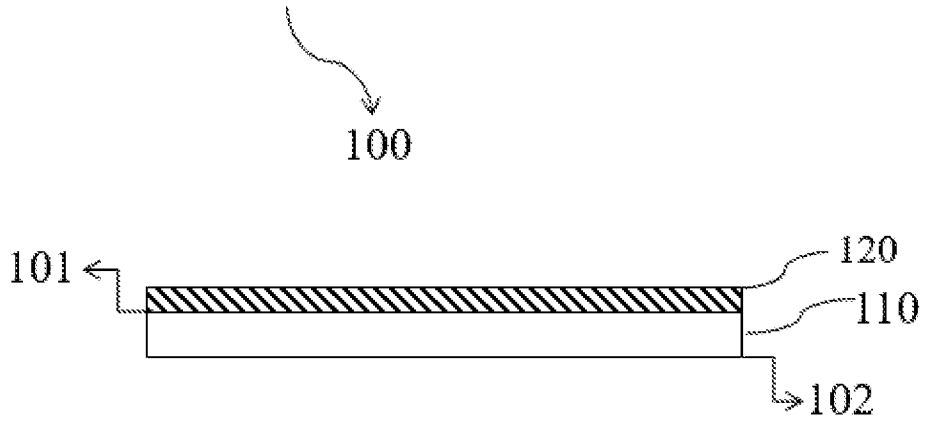

FIG. 1

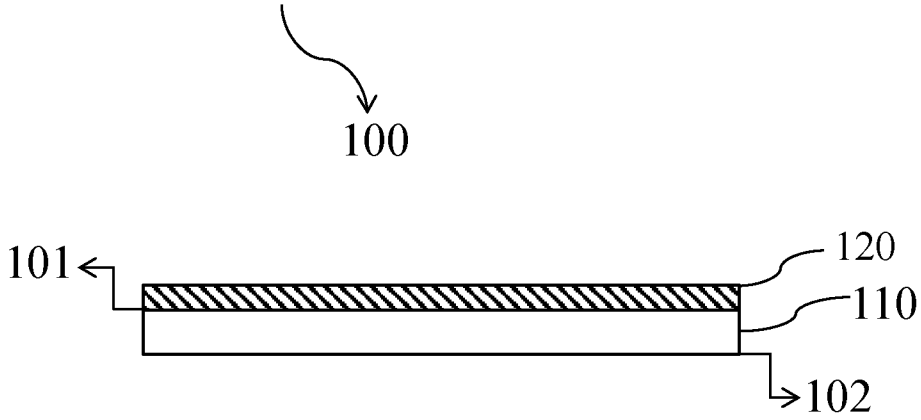

FIG. 1