

SPECIFICATION



G00002

PRESSURE-SENSITIVE ADHESIVE TAPE AND METHOD OF ADHERING SAME TO POROUS SURFACE

FIELD OF THE INVENTION



5 The present invention relates to a pressure-sensitive⁵⁰⁶⁰ adhesive tape to be adhered to a porous surface. More particularly, the present invention relates to a pressure-sensitive adhesive tape highly useful for masking during plating of various industrial products such as
10 electric/electronic equipment, automobile and the like, a pressure-sensitive adhesive tape for sealing that prevents permeation of coating liquids used for forming a film, and the like.

BACKGROUND OF THE INVENTION

15 In a production step of various industrial products such as electric/electronic equipment, automobiles and the like, plating is generally applied in an attempt to impart anticorrosiveness, design and the like. For plating, a pressure-sensitive adhesive tape is generally adhered in
20 advance to the part not intended for plating for the purpose of masking before plating, so that the undesired part will not be plated. As such pressure-sensitive adhesive tape for masking, one comprising a plastic film, paper and the like as a substrate, and an adhesive layer formed thereon, which
25 contains a heat resistant rubber adhesive or an acrylic adhesive, is generally used (e.g., P703 (Permacel)).

 When the surface on which to adhere the adhesive layer of the above-mentioned pressure-sensitive adhesive tape for masking (hereinafter to be also referred to as an adherend
30 surface) is substantially flat (surface having high flatness), a generally fine masking effect can be obtained, because inconvenience such as permeation of a plating solution from the periphery of the pressure-sensitive adhesive tape into the

masked area (what is called a bleeding) does not occur easily. However, when an adherend surface is porous, a plating solution permeates minute gaps present on the adherend surface corresponding to the periphery of the pressure-sensitive
5 adhesive tape, which are derived from the pores, thus resulting in bleeding. When a pressure-sensitive adhesive tape is to be adhered to a porous surface, therefore, the pores present on the porous surface are generally encapsulated with a resin, or the pores are narrowed or ruptured by an external
10 pressure, before adhesion of a pressure-sensitive adhesive tape. However, the processes for encapsulation of pores, narrowing of pores and rupturing thereof are complicated, and even if these processes are completed, bleeding cannot be suppressed sufficiently.

15 In the case of a pressure-sensitive adhesive tape for sealing to prevent permeation of the coating liquid into the part not desired to form a film, by sealing said part during formation of a film with various coating liquids, a sufficient sealing effect cannot be achieved when the surface to be
20 coated is porous, and a coating liquid may problematically permeate the adhesion area of the tape from the adjoining parts of the pressure-sensitive adhesive tape.

SUMMARY OF THE INVENTION

In view of the above-mentioned situation, it is therefore
25 an object of the present invention to provide a pressure-sensitive adhesive tape capable of affording a superior masking effect (sealing effect) of sufficiently filling the pores merely by substantially adhering the tape to a porous surface, without the need of a step of encapsulating pores on
30 a porous surface, narrowing the pores, rupturing the pores and the like, and a method of adhering the tape to a porous surface.

To achieve the above-mentioned object, the present

invention is characterized by the following.

(1) A pressure-sensitive adhesive tape comprising a tape substrate and an adhesive layer formed on at least one side of the tape substrate, which is used by adhering the adhesive
5 layer to a porous surface, wherein the aforementioned adhesive layer contains a toluene-soluble polydimethylsiloxane in a proportion of 8 - 30 wt%.

(2) The pressure-sensitive adhesive tape of the above-mentioned (1), wherein the adhesive layer is formed by heat
10 curing a film of a liquid comprising a silicone adhesive dissolved or dispersed therein, a hardener and a polydimethylsiloxane having a weight average molecular weight of 5,000 - 50,000, and the adhesive layer is left standing for not less than 24 hours at room temperature after adhesion to a
15 porous surface.

(3) The pressure-sensitive adhesive tape of the above-mentioned (1), wherein the adhesive layer is formed by heat curing a film of a liquid comprising a silicone adhesive dissolved or dispersed therein or a silicone adhesive and an
20 acrylic adhesive dissolved or dispersed therein, a hardener and a polydimethylsiloxane having a weight average molecular weight of 400 - 20,000, and the adhesive layer is heat-treated at 50 - 300°C for 1 - 60 minutes after adhesion to a porous surface.

25 (4) The pressure-sensitive adhesive tape of any of the above-mentioned (1) to (3), which is used for masking during plating.

(5) The pressure-sensitive adhesive tape of any of the above-mentioned (1) to (3), which is used for sealing when forming a
30 film.

(6) A method of adhering a pressure-sensitive adhesive tape to a porous surface, which comprises the following steps (A) to (C):

- (A) producing a coating liquid comprising a polydimethylsiloxane having a weight average molecular weight of 5,000 - 50,000 in a proportion of 8 - 30 wt% of a component capable of heat curing by adding a hardener and a
- 5 polydimethylsiloxane having a weight average molecular weight of 5,000 - 50,000 to a liquid comprising a silicone adhesive dissolved or dispersed therein,
- (B) producing a pressure-sensitive adhesive tape having an adhesive layer by heat curing a film obtained by applying the
- 10 aforementioned coating liquid to at least one side of a tape substrate, and
- (C) standing the tape at room temperature for not less than 24 hours after adhering the adhesive layer of the aforementioned pressure-sensitive adhesive tape to the porous surface.
- 15 (7) A method of adhering a pressure-sensitive adhesive tape to a porous surface, which comprises the following steps (A') to (C'):
- (A') producing a coating liquid comprising a polydimethylsiloxane having a weight average molecular weight
- 20 of 400 - 20,000 in a proportion of 8 - 30 wt% of a component capable of heat curing by adding a hardener and a polydimethylsiloxane having a weight average molecular weight of 400 - 20,000 to a liquid comprising a silicone adhesive dissolved or dispersed therein,
- 25 (B') obtaining a pressure-sensitive adhesive tape having an adhesive layer by heat curing a film obtained by applying the aforementioned coating liquid to at least one side of a tape substrate, and
- (C') heat-treating the tape at 50 - 300°C for 1 - 60 minutes
- 30 after adhering the adhesive layer of the aforementioned pressure-sensitive adhesive tape to the porous surface.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is explained in more detail in the

following.

The pressure-sensitive adhesive tape of the present invention is used by adhering its adhesive layer to a porous surface, and is characterized in that the adhesive layer
5 contains toluene-soluble polydimethylsiloxane in a proportion of 8 - 30 wt%. As used herein, the content (wt%) of the toluene-soluble polydimethylsiloxane is a value relative to the entire adhesive layer.

By the above-mentioned characteristics,
10 polydimethylsiloxane from the adhesive layer diffuses into the pores on a porous surface to fill the pores upon adhesion of the adhesive layer of the pressure-sensitive adhesive tape of the present invention to a porous surface.

In the present invention, by the "toluene-soluble
15 polydimethylsiloxane" is meant one capable of dissolving in toluene under the conditions described under [content of toluene-soluble polydimethylsiloxane in the adhesive layer] to be mentioned later. Such polydimethylsiloxane is retained in an adhesive layer before adhesion to a porous surface and,
20 upon adhesion of the adhesive layer to a porous surface, can diffuse from the adhesive layer into the pores on a porous surface. The weight-average molecular weight of such polydimethylsiloxane is preferably about 400 - 50,000, more preferably 1,000 - 30,000.

25 In addition, by "a porous surface" is meant, for example, a surface of a material (product) having a surface layer comprising a number of micro-pores having a size of several microns or smaller, such as a surface of a metal material that underwent an etching treatment (e.g., chemical etching,
30 electrolytic etching and the like).

In the present invention, when the content of the toluene-soluble polydimethylsiloxane in the adhesive layer is less than 8 wt%, polydimethylsiloxane does not sufficiently

diffuse into the pores on a porous surface, thus failing to afford a fine masking effect (sealing effect), whereas when it exceeds 30 wt%, a cohesive force of an adhesive decreases, thus resulting in difficult shape retention of a pressure-sensitive adhesive tape.

In the present invention, the content of the toluene-soluble polydimethylsiloxane in the adhesive layer is preferably not less than 10 wt%. The aforementioned content is preferably not more than 20 wt%, more preferably not more than 15 wt%.

In the present invention, an adhesive layer is generally formed on either side of the tape substrate. Where necessary, it may be formed on both sides. As the adhesive layer, any adhesive may be used, but the use of a silicone adhesive or a silicone adhesive and an acrylic adhesive in combination is preferable.

The silicone adhesive is generally classified into peroxide curable silicone adhesives and addition reaction type silicone adhesives. A peroxide curable silicone adhesive is used after increasing the cohesive force by a curing (crosslinking) reaction using peroxide as a catalyst. An addition reaction type silicone adhesive is used after increasing the cohesive force by a hydrosilylation crosslinking reaction using a metal catalyst. In the present invention, both peroxide curable silicone adhesive and addition reaction type silicone adhesive can be used.

In the present invention, commercially available peroxide curable silicone adhesives and commercially available addition reaction type silicone adhesives can be used. As the commercially available peroxide curable silicone adhesives, for example, SH4280 (Dow Corning Toray Silicone Co., Ltd.), KR-12 (Shin-Etsu Chemical Co., Ltd.) and the like can be mentioned. As the commercially available addition reaction

type silicone adhesives, for example, SD4570 (Dow Corning Toray Silicone Co., Ltd.), X-40-3004A (Shin-Etsu Chemical Co., Ltd.) and the like can be mentioned.

As the peroxide used as a curing agent (crosslinking agent) of the peroxide curable silicone adhesive, for example, benzoyl peroxide, dicumyl peroxide, p-chlorobenzoyl peroxide, 2,4-dichlorobenzoyl peroxide, di-t-butyl peroxide and the like can be mentioned. These peroxides may be used alone or used in combination of two or more kinds thereof. The amount thereof to be used is about 0.5 - 2.5 parts by weight per 100 parts by weight of the silicone adhesive. As the metal catalyst to be used as a curing agent (crosslinking agent) of the addition reaction type silicone adhesive, a hydrogen hexachloroplatinate catalyst is preferable. The amount of the metal catalyst to be used is about 0.5 - 1.5 parts by weight per 100 parts by weight of the silicone adhesive.

The peroxide curable silicone adhesive and addition reaction type silicone adhesive are generally commercially available in the form of a liquid of an adhesive dissolved or dispersed in a suitable solvent (hereinafter to be also referred to as an adhesive solution). When such an adhesive is used, an adhesive layer is formed by preparing a coating liquid comprising an adhesive solution and a curing agent (peroxide, metal catalyst), applying same to a substrate to give a film, and subjecting the obtained film to heat crosslinking (curing). More specifically, an adhesive layer is formed by stabilization of the state of the film by a rubber-like product film of silicone produced by heating.

When an adhesive layer is formed using both a silicone adhesive and an acrylic adhesive, an acrylic adhesive (acrylic polymer) and a crosslinking agent (e.g., polyol, polyamine, isocyanate etc.) therefor are added to a liquid containing the above-mentioned silicone adhesive and a curing agent to give a

coating liquid, which is applied to a substrate to give a film and the film is heated. As a result, an adhesive layer comprising a mixture (denatured product) of a silicone adhesive and an acrylic adhesive is formed.

5 As the preferable acrylic adhesive (acrylic polymer) to be used in the present invention, a polymer of alkyl (meth)acrylate and/or a copolymer of alkyl (meth)acrylate and a comonomer copolymerizable therewith can be mentioned.

10 As the above-mentioned copolymer, a first copolymer wherein (meth)acrylic acid compound having not more than 5 carbon atoms (carbon number of the entire compound), vinyl acetate, styrene and the like (first comonomer) is copolymerized as a comonomer, a second copolymer wherein a functional group-containing monomer (second comonomer) is
15 copolymerized as a comonomer, and a third copolymer wherein the above-mentioned first and second comonomers are copolymerized can be mentioned. As used herein, the first and the second comonomers may be a single kind of compound or two or more kinds of compounds.

20 The alkyl (meth)acrylate is preferably one wherein the alkyl group has 4 - 18 carbon atoms. Of those, 2-ethylhexyl (meth)acrylate, butyl (meth)acrylate, isobutyl (meth)acrylate, hexyl (meth)acrylate, octyl (meth)acrylate, isooctyl (meth)acrylate, decyl (meth)acrylate, isodecyl (meth)acrylate,
25 lauryl (meth)acrylate, stearyl (meth)acrylate and the like are particularly preferably used. Only one kind of these compounds may be used or two or more kinds thereof may be used in combination.

30 The (meth)acrylic acid compound having not more than 5 carbon atoms in the first comonomer is exemplified by (meth)acrylic acid, methyl (meth)acrylate, acrylonitrile, acrylamide and the like. The functional group-containing monomer of the second comonomer is exemplified by a monomer

containing hydroxyl group, a monomer containing carboxyl group, a monomer containing amido group, a monomer containing amino group and the like, wherein the monomer containing hydroxyl group is preferably exemplified by hydroxyalkyl
5 (meth)acrylate such as 2-hydroxyethyl (meth)acrylate, 2-hydroxypropyl (meth)acrylate and the like; the monomer containing carboxyl group is preferably exemplified by monoalkyl maleate such as butyl maleate and the like, maleic acid, maleic anhydride, fumaric acid, crotonic acid and the
10 like; the monomer containing amido group is preferably exemplified by alkyl (meth)acrylamide such as dimethyl acrylamide, diethyl acrylamide and the like; alkylethermethylol (meth)acrylamide such as butoxymethyl acrylamide, ethoxymethyl acrylamide and the like; diacetone
15 acrylamide and the like; and the monomer containing amino group is preferably exemplified by dimethylaminoethyl acrylate.

The amount of the copolymerized comonomer in the above-mentioned first to third copolymers is preferably not more
20 than 50 wt% of the entire amount of the copolymer, and the following polyfunctional monomers may be further copolymerized in the first to the third copolymers.

[polyfunctional monomer]

1,6-hexaneglycol dimethacrylate, tetraethyleneglycol
25 diacrylate, trimethylolpropane triacrylate, divinylbenzene, divinyltoluene, diallyl phthalate, diallyl maleate, diallyl adipate, diallyl glycolate, triallyl isocyanurate, diethyleneglycol bisallylcarbonate and the like.

Only one kind of these polyfunctional monomers may be
30 used or two or more kinds thereof may be used in combination. The amount thereof to be used is generally not more than 10 wt% of the total weight of the alkyl (meth)acrylate and the comonomers.

The amount of an acrylic adhesive to be used when the acrylic adhesive is used concurrently with a silicone adhesive in the weight ratio of the two (silicone adhesive/acrylic adhesive) is preferably 20/80 - 80/20, particularly preferably
5 40/60 - 60/40. When the proportion of the acrylic adhesive exceeds this range, a low molecular weight component (weight-average molecular weight of generally about 500 - 5,000) in the silicone adhesive unpreferably blooms, whereas when it is smaller, the effect provided by the addition of an acrylic
10 adhesive is difficult to express.

When an acrylic adhesive is used, a small amount of an adhesiveness-imparting polymer substance such as rosin resin, a terpene resin such as α -pinene, β -pinene and the like, terpene-phenol resin, petroleum resin and the like may be
15 added.

The amount of the adhesive in an adhesive layer is preferably such an amount that makes the solid content of one side of a substrate about 5 - 50 g/m², particularly preferably about 25 - 40 g/m². A solid content of less than 5 g/m² is not
20 preferable, because adhesion to a porous surface becomes difficult, and when an amount of the solid adhered is more than 50 g/m², the adhesive preferably sticks out from the tape end to change the tape shape.

A part of toluene-soluble polydimethylsiloxane in an
25 adhesive layer of the pressure-sensitive adhesive tape of the present invention may be derived from a silicone adhesive. That is, some of the commercially available silicone adhesives contain toluene-soluble polydimethylsiloxane. However, the content of the toluene-soluble polydimethylsiloxane of
30 commercially available silicone adhesives is small. When an adhesive layer is formed with such silicone adhesives, the amount of the toluene-soluble polydimethylsiloxane in the adhesive layer does not exceed 8 wt%. Accordingly,

polydimethylsiloxane is further added to commercially available silicone adhesives (an adhesive solution), and the adhesive layer is formed using such an adhesive solution. As a result, toluene-soluble polydimethylsiloxane can be contained
5 in an adhesive layer in a proportion of not less than 8 wt%. As mentioned above, the polydimethylsiloxane to be added to an adhesive solution may be a commercially available product or one having a weight-average molecular weight of 400 - 50,000 is used. In addition, its molecular form may be linear or
10 cyclic and is not particularly limited. However, linear one is preferable. Specific examples thereof include SH200CV-300cs (linear) (Dow Corning Toray Silicone Co., Ltd.), SH200-20cs (linear) (Dow Corning Toray Silicone Co., Ltd.), SH200CV-110cs (linear) (Dow Corning Toray Silicone Co., Ltd.), dodecamethyl
15 cyclohexasiloxane (cyclic) (Shin-Etsu Chemical Co., Ltd.) and the like.

As mentioned above, when polydimethylsiloxane is further added to a silicone adhesive in the present invention, the amount to be added can be appropriately determined depending
20 on the content of toluene-soluble polydimethylsiloxane (polydimethylsiloxane having weight-average molecular weight of 400 - 50,000) originally contained in the silicone adhesive, and the amount is generally determined from the range of 1 - 30 parts by weight per 100 parts by weight of the
25 silicone adhesive (solid content). As a result, the above-mentioned amount to be added is determined such that 8 - 30 wt% of the heat curable component in the coating liquid to be applied to a tape substrate is occupied by the above-mentioned polydimethylsiloxane. The "heat curable component" means a
30 component that forms a film without dissipation due to vaporization and the like in the below-mentioned heat-curing step.

In the present invention, the tape substrate is not

particularly limited and known substrates conventionally used as tape substrates, such as plastic film, paper, metal film and the like, can be used. Of these, plastic film and paper are preferable, more preferably it is a polyimide film or
5 paper, and particularly preferably a polyimide film. When the substrate is a polyimide film, the substrate does not shrink during a heating step of baking finish, which is preferable.

While the thickness of the tape substrate varies depending on the material constituting the tape substrate, it
10 is generally 0.02 - 0.30 mm. When a polyimide film is used, the thickness thereof is preferably about 0.025 - 0.050 mm. This is because a thick plastic film has a greater apparent elastic modulus and is poor in adherend followability.

Preparation of the pressure-sensitive adhesive tape of
15 the present invention and adhesion of the tape to a porous surface include, for example, the following steps.

First, a coating liquid obtained by adding a curing agent and polydimethylsiloxane having a weight-average molecular weight of 400 - 50,000 (preferably 1,000 - 30,000) to an
20 adhesive solution of a silicone adhesive is prepared and the coating liquid is applied to at least one side of a substrate. The film obtained by coating is heat treated (heat cured) at a temperature of not lower than 100°C and less than 300°C (preferably at a temperature of 130 - 260°C) to give an
25 adhesive layer. The thus prepared adhesive layer of a pressure-sensitive adhesive tape is adhered to a porous surface and stood at a room temperature for not less than 24 hours or subjected to a heat treatment at a temperature of 50 - 300°C for 1 - 60 min., whereby polydimethylsiloxane diffuses
30 from the inside of the adhesive layer into the pores on a porous surface.

When, after adhering an adhesive layer to a porous surface, pores on a porous surface are to be filled with

polydimethylsiloxane by allowing to stand at room temperature for not less than 24 hours, polydimethylsiloxane in a coating liquid preferably has a weight-average molecular weight of about 5,000 - 50,000, more preferably 10,000 - 30,000. When,
5 after adhering an adhesive layer to a porous surface, pores on the porous surface are to be filled with polydimethylsiloxane by a heat treatment at a temperature of 50 - 300°C for 1 - 60 min., polydimethylsiloxane in a coating liquid preferably has a weight-average molecular weight of about 400 - 20,000, more
10 preferably 1,000 - 15,000.

The property values in the present specification are measured according to the following methods.

[weight-average molecular weight of polydimethylsiloxane]

The weight-average molecular weight was measured at a
15 sample concentration of 1.0 g/l using AS-8020, CO-8020, CCPS, SD-8022, RI-8010 (TOSOH) as a GPC (Gel Permeation Chromatography) device, TSKgel GMH_{HR}-H/GMH_{HR}-H/G2000_{HR} (TOSOH) for the column, and toluene as an eluent.

[content of toluene-soluble polydimethylsiloxane in the
20 adhesive layer]

An adhesive (ca. 100 mg) constituting the adhesive layer is packaged with a PTFE (polytetrafluoroethylene) membrane and immersed in about 50 ml of toluene for a week. Then, the PTFE membrane is taken out, toluene is vaporized and the PTFE
25 membrane wrapping the adhesive is dried. From the weight changes of the PTFE membrane during evaporation to dryness, a sol fraction of the adhesive is calculated. The dry adhesive is taken out from the dry PTFE membrane, dissolved in chloroform-dl, and polydimethylsiloxane ($-\text{Si}(\text{CH}_3)_2-\text{O}-$) amount
30 is calculated from ^1H -NMR (protone nuclear magnetic resonance), based on which the polydimethylsiloxane content of the adhesive layer is determined by calculation.

Examples

The present invention is explained in more detail in the following by referring to examples, which are not to be construed as limitative.

5 Example 1

Peroxide (1.5 parts by weight, NYPER BMT (NOF Corporation)) was added per 100 parts by weight (solid content) of peroxide curable silicone SH4280 (solution) (Dow Corning Toray Silicone Co., Ltd.), and linear
10 polydimethylsiloxane (5 parts by weight, SH200CV-300cs (Dow Corning Toray Silicone Co., Ltd.)) having a weight-average molecular weight of 17800 was added to give an adhesive solution (coating liquid). This coating liquid was applied to one side of a tape substrate (thickness 25 μm) consisting of
15 polyimide to give a film. The film was dried by heating at a surface temperature of 246°C to give a pressure-sensitive adhesive tape having an adhesive layer and a solid content of 40 g/m². A part of the adhesive layer was taken and the amount of the toluene-soluble component was measured. As a result,
20 the polydimethylsiloxane content was 13.2 wt%.

Example 2

In the same manner as in Example 1 except that 2 parts by weight of linear polydimethylsiloxane (SH200-20cs (Dow Corning Toray Silicone Co., Ltd.)) having a weight-average molecular
25 weight of 3470 was used instead of linear polydimethylsiloxane (SH200CV-300cs (Dow Corning Toray Silicone Co., Ltd.)) having a weight-average molecular weight of 17800, a pressure-sensitive adhesive tape having an adhesive layer and a solid content of 40 g/m² was prepared. A part of this adhesive layer
30 was taken and the amount of the toluene-soluble component was measured. As a result, the polydimethylsiloxane content was 9.6 wt%.

Example 3

In the same manner as in Example 1 except that 5 parts by weight of linear polydimethylsiloxane (SH200CV-110cs (Dow Corning Toray Silicone Co., Ltd.)) having a weight-average
5 molecular weight of 12600 was used instead of the linear polydimethylsiloxane (SH200CV-300cs (Dow Corning Toray Silicone Co., Ltd.)) having a weight-average molecular weight of 17800, a pressure-sensitive adhesive tape having an
10 adhesive layer and a solid content of 40 g/m² was prepared. A part of this adhesive layer was taken and the amount of the toluene-soluble component was measured. As a result, the polydimethylsiloxane content was 14.5 wt%.

Comparative Example 1

In the same manner as in Example 1 except that the linear
15 polydimethylsiloxane (SH200CV-300cs (Dow Corning Toray Silicone Co., Ltd.)) having a weight-average molecular weight of 17800 was not added, a pressure-sensitive adhesive tape having an adhesive layer and a solid content of 40 g/m² was prepared. A part of this adhesive layer was taken and the
20 amount of the toluene-soluble component was measured. As a result, the polydimethylsiloxane content was 6.2 wt%.

Comparative Example 2

In the same manner as in Example 1 except that the amount of addition of the linear polydimethylsiloxane (SH200CV-300cs
25 (Dow Corning Toray Silicone Co., Ltd.)) having a weight-average molecular weight of 17800 was set for 0.2 part by weight, a pressure-sensitive adhesive tape having an adhesive layer and a solid content of 40 g/m² was prepared. A part of this adhesive layer was taken and the amount of the toluene-
30 soluble component was measured. As a result, the polydimethylsiloxane content was 6.5 wt%.

The pressure-sensitive adhesive tapes of the above-mentioned Examples 1-3 and Comparative Examples 1 and 2 were

subjected to the following confirmation test for the masking effect.

- (i) Samples were prepared by press adhering a pressure-sensitive adhesive tape (pressure-sensitive adhesive tapes of Examples 1 - 3 and Comparative Examples 1 and 2) to a surface of the porous layer side of an aluminum plate formed by electrolytic etching and having an about 40 μm thick porous surface layer as an adherend with a 2 kg roller, and left standing at room temperature for 6 days (144 hours). In the same manner as above, a sample was further prepared by adhering a pressure-sensitive adhesive tape to the surface on the porous layer side of an aluminum plate. The sample was heat treated at 100°C for 20 min. in a drying machine and allowed to cool to room temperature.
- (ii) Each of the above-mentioned samples was immersed in distilled water from the part free of adhesion of a tape up to the end of the tape adhesion part, and after 1 minute's lapse, taken out from the distilled water. The tape was peeled off from the adherend, and the amount of distilled water permeated from the distilled water/tape interface was visually read.

The test results are shown in Table 1

Table 1

	Left at room temperature for 6 days	Heated at 100°C for 20 min.
Example 1	0	not less than 10 mm
Example 2	not less than 10 mm	0
Example 3	0	0
Comparative Example 1	not less than 10 mm	not less than 10 mm
Comparative Example 2	not less than 10 mm	not less than 10 mm

As shown in Table 1, the pressure-sensitive adhesive tape of Example 1 showed a superior masking effect (sealing effect) by adhering an adhesive layer to a porous surface and standing the tape at room temperature. The pressure-sensitive adhesive
5 tape of Example 2 showed a superior masking effect (sealing effect) by adhering an adhesive layer to a porous surface and then heat treating the tape. The pressure-sensitive adhesive tape of Example 3 showed a superior masking effect (sealing effect) when an adhesive layer was adhered to a porous surface
10 and either stood at room temperature or heat-treated.

As is clear from the foregoing explanation, in the pressure-sensitive adhesive tape of the present invention, by adhering an adhesive layer to a porous surface and leaving the tape at room temperature for a given time or heat treating the
15 adhesive layer, polydimethylsiloxane diffuses from the inside of the adhesive layer to pores present on a porous surface to fill the pores. Thus, the pressure-sensitive adhesive tape of the present invention shows a superior masking effect as a pressure-sensitive adhesive tape for masking the part unwanted
20 for plating during, for example, plating a porous surface in the production steps of various products such as electric/electronic equipment, automobile and the like. In addition, the pressure-sensitive adhesive tape of the present invention shows a superior sealing effect as a pressure-
25 sensitive adhesive tape for sealing, which prevents permeation of various coating liquids into the undesired part on a coated surface during a film forming process by sealing said part.

This application is based on patent application No. 2002-
30 159551 filed in Japan, the contents of which are hereby incorporated by reference.

WHAT IS CLAIMED IS

1. A pressure-sensitive adhesive tape comprising a tape substrate and an adhesive layer formed on at least one side of the tape substrate, which is used by adhering the adhesive layer to a porous surface, wherein the aforementioned adhesive layer contains a toluene-soluble polydimethylsiloxane in a proportion of 8 - 30 wt%.
2. The pressure-sensitive adhesive tape of claim 1, wherein the adhesive layer is formed by heat curing a film of a liquid comprising a silicone adhesive dissolved or dispersed therein, a hardener and a polydimethylsiloxane having a weight average molecular weight of 5,000 - 50,000, and the adhesive layer is left standing for not less than 24 hours at room temperature after adhesion to a porous surface.
3. The pressure-sensitive adhesive tape of claim 1, wherein the adhesive layer is formed by heat curing a film of a liquid comprising a silicone adhesive dissolved or dispersed therein, a hardener and a polydimethylsiloxane having a weight average molecular weight of 400 - 20,000, and the adhesive layer is heat-treated at 50 - 300°C for 1 - 60 minutes after adhesion to a porous surface.
4. The pressure-sensitive adhesive tape of any of claims 1 to 3, which is used for masking during plating.
5. The pressure-sensitive adhesive tape of any of claims 1 to 3, which is used for sealing when forming a film.
6. A method of adhering a pressure-sensitive adhesive tape to a porous surface, which comprises the following steps (A) to

(C):

(A) producing a coating liquid comprising a polydimethylsiloxane having a weight average molecular weight of 5,000 - 50,000 in a proportion of 8 - 30 wt% of a component
5 capable of heat curing by adding a hardener and a polydimethylsiloxane having a weight average molecular weight of 5,000 - 50,000 to a liquid comprising a silicone adhesive dissolved or dispersed therein,

(B) producing a pressure-sensitive adhesive tape having an
10 adhesive layer by heat curing a film obtained by applying the aforementioned coating liquid to at least one side of a tape substrate, and

(C) standing the tape at room temperature for not less than 24 hours after adhering the adhesive layer of the aforementioned
15 pressure-sensitive adhesive tape to the porous surface.

7. A method of adhering a pressure-sensitive adhesive tape to a porous surface, which comprises the following steps (A') to (C'):

20 (A') producing a coating liquid comprising a polydimethylsiloxane having a weight average molecular weight of 400 - 20,000 in a proportion of 8 - 30 wt% of a component capable of heat curing by adding a hardener and a polydimethylsiloxane having a weight average molecular weight
25 of 400 - 20,000 to a liquid comprising a silicone adhesive dissolved or dispersed therein,

(B') obtaining a pressure-sensitive adhesive tape having an adhesive layer by heat curing a film obtained by applying the aforementioned coating liquid to at least one side of a tape
30 substrate, and

(C') heat-treating the tape at 50 - 300°C for 1 - 60 minutes after adhering the adhesive layer of the aforementioned pressure-sensitive adhesive tape to the porous surface.