

ADHESIVE SHEET FOR PLATING

Technical Field

The present invention generally relates to an adhesive
5 sheet (tape) for plating, and more specifically to an adhesive
sheet (tape) which, when one side of a lead frame is being
plated during the QFN process, protects the other side thereof
from infiltration of a plating solution and then is peeled
therefrom, which provides high chemical resistance during
10 plating, and which not only ensures excellent size stability
of parts but also can be peeled without leaving any residues
during peeling, thereby securing reliability and workability.

Background Art

15 In general, a QFN (Quad Flat No Lead) package is a type
of semiconductor manufacturing technique in which a lead
terminal is mounted inside a package, and is commonly subject
to such processes as die attach, wire bonding, epoxy molding
and so on. Here, a plating process which is added to such
20 processes described above is a pre-process to be performed
to enhance the binding strength between a lead frame and epoxy
during the epoxy molding process. An adhesive sheet which is
used during such process is used to protect the other side
of a lead frame from the infiltration of a plating solution
25 when one side thereof is being plated and then is to be peeled
therefrom.

Accordingly, it is necessary for such an adhesive sheet
for plating to have cohesion and chemical resistance in the
adhesive layer, so as to prevent the infiltration of a plating
30 solution during the plating process and to be peeled without
leaving any residues on the lead frame during the peeling after
the plating process.

Disclosure of Invention

Therefore, the present invention is designed to solve the above mentioned problems, it is an object of the present invention to provide an adhesive sheet (tape) for plating which
5 ensures high chemical resistance during plating with excellent cohesion of an adhesive layer through heat-cure and, additionally, by triggering a cross-linking reaction through energy-beam irradiation.

In addition, it is another object of the present invention
10 to provide an adhesive sheet (tape) for plating which not only ensures excellent size stability of parts but also can be peeled without leaving any residues during the peeling, thereby securing reliability and workability.

These and other objects and advantages of the present
15 invention will be apparent from the following detailed description of the invention.

The above object is achieved by an adhesive sheet for plating comprising a substrate and an adhesive layer formed on at least one side of the substrate, the adhesive layer being
20 coated with an adhesive composition containing a heat-curable adhesive resin and a heat-curing agent.

Here, the adhesive composition further comprises an energy-beam curable acrylic-based oligomer resin and an energy-beam initiator.

25 Preferably, the substrate is at least one film selected from polyester, polyimide, polyamide, polyether sulfone, polyphenylene sulfide, polyether ketone, polyether ether ketone, triacetyl cellulose, polyether imide, polyethylene naphthalate, polypropylene and polycarbonate.

30 The substrate is preferably at least one metal foil selected from a foil, an alloy foil and a plated foil consisting of aluminium, magnesium, titanium, chromium, manganese, iron, nickel, zinc or tin.

The heat-curable adhesive resin preferably has a weight average molecular weight of 40,000~3,000,000.

It is preferred to use one or more kinds of the heat-curing agents in combination according to design purposes, and the
5 amount of the heat-curing agent to be used is 1 to 20 parts by weight per 100 parts by weight of the heat-curable adhesive resin.

It is preferable to use one or more kinds of the energy-beam curable acrylic-based oligomer resin in combination according
10 to design purposes, and the amount of the energy-beam curable acrylic-based oligomer resin to be used is 1 to 20 parts by weight per 100 parts by weight of the heat-curable adhesive resin.

In addition, it is preferred to use one or more kinds
15 of the energy-beam initiator in combination according to design purposes, and the amount of the energy-beam initiator to be used is 1 to 20 parts by weight per 100 parts by weight of the energy-beam curable acrylic-based oligomer resin.

Preferably, the adhesive sheet for plating may adjust
20 the internal cohesion, chemical resistance and peeling strength of the adhesive layer, by varying the amount of the energy-beam curable acrylic-based oligomer resin.

The adhesive sheet for plating preferably has an adhesive strength of 150 g·f/2.54cm (width) to 480 g·f/2.54cm (width)
25 after the adhesive sheet is deposited on a copper foil and is heated for 10 minutes at 130℃, and then it is kept at room temperature for 30 minutes.

The present invention has an effect of providing an adhesive sheet for plating which provides high chemical
30 resistance during the plating process, and which not only ensures excellent size stability of parts but also can be peeled without leaving any residues during the peeling, thereby securing reliability and workability.

Brief Description of the Drawings

Fig. 1 is a cross-sectional view of an adhesive sheet for plating according to an embodiment of the present invention.

<Brief Description of the Main parts of the Drawing>

1: substrate film

2: adhesive layer

3: release film for protecting adhesive layer

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Best Mode for Carrying out the Invention

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. It should be understood that the detailed description of the preferred embodiments of the invention are given by way of illustration only, and accordingly various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art.

20 An adhesive sheet (tape) for plating according to the present invention, which is an adhesive sheet that, when one side of a lead frame is being plated during the QFN process, protects the other side thereof from infiltration of a plating solution and then is peeled therefrom, comprises a substrate (1) and an adhesive layer (2) formed on at least one side of the substrate (1), the adhesive layer (2) being coated with an adhesive composition containing a heat-curable adhesive resin and heat-curing agent. The adhesive composition is preferable to further comprise an energy-beam curable acrylic-based oligomer resin and an energy-beam initiator.

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Though common silicone-based adhesive resins have a good adhesive strength, it has difficulty in adjusting the adhesive strength and is likely to have contamination from the silicone

residues on the material to be adhered. However, a method of producing an adhesive layer in the adhesive sheet for plating according to the present invention is unique in that a heat resistant adhesive layer is produced by enhancing the cohesive
5 strength of the adhesive layer using an acrylic-based adhesive resin and a heat-curing agent, or additionally by triggering a cross-linking reaction through irradiation of energy-beam onto an energy-beam curable oligomer.

The heat-curable acrylic-based adhesive resin may be
10 formed in a mixed cross-link structure known as 'Interpenetrating polymer network', and the mixed cross-link structure is a cross-link structure in which two different kinds of curable resins are linked by interpenetration while the two different kinds of curable resins are independently
15 cross-linking through different chemical reaction mechanism from each other. Such a cross-linking structure may provide characteristics of cohesion and chemical resistance in the resins, and applications of 'Interpenetrating polymer network' include a method for manufacturing epoxy adhesive
20 resins (Epoxy Adhesive Formulation; Edward M. Petrie; 151-152p). In order to achieve the above-mentioned object, the present invention makes use of an energy-beam curing method to form the mixed cross-link structure by interpenetration, and which is a different method for manufacturing adhesive
25 sheets from prior arts.

Hereinafter, various components of the present invention will be described in detail.

Substrate

The substrate of an adhesive sheet for plating according
30 to the present invention is preferably, but not limited to, at least one (plastic) film selected from polyester, polyimide, polyamide, polyether sulfone, polyphenylene sulfide, polyether ketone, polyether ether ketone, triacetyl cellulose,

polyether imide, polyethylene naphthalate, polypropylene and polycarbonate. In addition, a metal foil may be used for the substrate instead of a (plastic) film, and especially at least one metal foil selected from a foil, an alloy foil and a plated foil consisting of aluminium, magnesium, titanium, chromium, manganese, iron, nickel, zinc or tin may be used.

Adhesive Composition

The heat-curable adhesive resin used for the adhesive layer of an adhesive sheet for plating according to the present invention comprises alkyl (meth)acrylates such as methyl (meth)acrylate, ethyl (meth)acrylate, butyl (meth)acrylate, isoamyl (meth)acrylate, n-hexyl (meth)acrylate, 2-ethylhexyl (meth)acrylate, isooctyl (meth)acrylate, isononyl (meth)acrylate, decyl (meth)acrylate, dodecyl (meth)acrylate and so on, and serves to provide adhesiveness. In addition, such heat-curable acrylic-based adhesive resins preferably have a weight average molecular weight of 40,000~3,000,000, and more preferably of 700,000~1,200,000. This is because if the weight average molecular weight of the heat-curable acrylic-based adhesive resin is lower than 40,000, then the adhesive resin does not have enough chemical resistance, and if over 3,000,000, then the curing reaction may be affected due to high molecular weight. By using such acrylic-based adhesive resins along with heat-curing agents, it is possible to secure cohesive strength and to avoid the occurrence of adhesive residues as well.

In addition, the energy-beam curable acrylic-based oligomer resin used for the adhesive layer of the adhesive sheet for plating according to the present invention comprises a urethane-based acrylate, a polyether and polyester acrylate, an epoxy acrylate, an acrylic acrylate and so on, and also comprises a diazotized amino-novolak resin, a cinnamoyl-containing polymer, a photo-cation polymerizable

resin, a thiol-addable resin having an allyl group at the molecule terminal other than the acrylic-based resins. Furthermore, high energy-beam reactive polymers include an epoxidized polybutadiene, an unsaturated polyester, a polyglycidyl methacrylate, a polyacrylamide and a polyvinyl siloxane.

The number of active functional groups of the above resins is preferably of 2 to 6. Moreover, the weight average molecular weight of such energy-beam curable acrylic-based oligomer resins is preferably of 300 to 8,000. The above resins may be designed to react with an energy-beam initiator so as to provide internal cohesive strength to the adhesive layer. Accordingly, an adhesive layer that has high chemical resistance but does not leave any residues can be obtained.

Furthermore, the above mixed acrylic-based adhesive for the adhesive sheet for plating according to the present invention should include a heat-curing agent or an energy-beam initiator in order to trigger a curing reaction. Examples of such curing agent may include isonate-based, epoxy-based, aziridine and chelate-based cross-linking agents. Though the amount of the curing agent to be used is not limited, it is preferable to use 1 to 20 parts by weight per 100 parts by weight of the heat-curable acrylic-based adhesive resin, and more preferably of 2 to 7 parts by weight. Therefore, the acrylic-based adhesive may be designed to exhibit appropriate adhesive strength by using it with the heat-curing agent.

Moreover, the energy-beam initiator comprises benzyl dimethyl ketal, hydroxycyclohexyl phenyl ketone, hydroxy dimethyl acetophenone, methyl-[4-methylthiophenyl]-2-morpholine propanone, 4-benzyl-4'-methyldiphenyl sulfide, isopropylthioxanthone, 2-chlorothioxanthone, ethyl-4-dimethylaminobenzoate, 2-ethylhexyl-4-dimethylaminobenzoate, benzophenone,

4-methylbenzophenone, methyl-ortho-benzo-benzoate,
methylbenzoylfomate, 4-phenylbenzophenone,
2,4,6-trimethylbenzoyl-diphenyl phosphine,

2-hydroxy-1,2-diphenylethanone and so on. Such energy-beam
5 initiators may be chosen according to the coating and drying
temperature of the adhesive layer and the irradiation condition
of the energy-beam to be used. The amount of the energy-beam
initiator to be used is preferably of about 1 to 20 parts by
weight per 100 parts by weight of the energy-beam curable
10 acrylic-based oligomer resin. In addition, it is preferred
to use one or more kinds of the energy-beam initiator in
combination depending on design purposes.

Method for producing an adhesive layer

A method for producing an adhesive sheet for plating
15 according to the present invention is not limited; however,
an adhesive composition comprising a heat-curable
acrylic-based adhesive resin and a heat-curing agent component
or additionally an energy-beam curable acrylic-based oligomer
resin and an energy-beam initiator component is prepared with
20 a solvent. The adhesive composition is prepared with different
viscosity depending on design purposes. There are different
techniques available to produce an adhesive layer including
a casting method in which an adhesive composition is directly
coated on a substrate and is dried to form an adhesive layer
25 and a transfer method in which an adhesive composition is coated
on a release film and is dried to form an adhesive layer, and
then the adhesive layer is laminated on a substrate to transfer
the adhesive layer onto the substrate. In such cases, the
coating thickness of the adhesive layer is preferably of 5
30 to 25 μm , and more preferably of 6 to 10 μm . In the adhesive
layer of the present invention, the amount (based on the solid
content) of the energy-beam curable acrylic-based oligomer
resin to be used is preferably of 1 to 20 parts by weight per

100 parts by weight of the heat-curable acrylic adhesive resin. In this case, when the amount of the energy-beam curable acrylic-based oligomer resin is added more than necessary, a cross-link structure by interpenetration may not form or
5 the adhesive layer may be hardened too much. In addition, it is preferable to use one or more kinds of the energy-beam curable acrylic-based oligomer resin in combination depending on design purposes.

Method of energy-beam curing

10 In order to cure the adhesive layer produced according to the method as described above, energy-beam such as visible rays, ultraviolet rays and electron-beam is used for curing reaction to create a cross-link structure in the adhesive layer. Though the kinds of energy beam are not limited specifically;
15 it is preferred to use ultraviolet rays. The ultraviolet curing which is a chemical reaction that lasts for very short time needs a predetermined amount of light for complete curing. If the amount of light for curing is less than the predetermined amount, then the cured product may contain non-cured parts
20 thereon. On the other hand, if the amount of light for curing is more than necessary, then it may cause decomposition of a substrate film or an adhesive resin. In addition, since the ultraviolet rays are accompanied by infrared rays, the heat of the infrared rays may cause an adverse effect on the adhesive
25 sheet. Accordingly, an appropriate amount of light is preferably of $10 \sim 2000 \text{ mJ/cm}^2$, and more preferably of $400 \sim 1000 \text{ mJ/cm}^2$ with reference to the ultraviolet A (UV-A) range. And ultraviolet lamps are classified into a mercury lamp which has a short wavelength (ultraviolet B, C) range as its main
30 range and a metal halide lamp which has a long wavelength (ultraviolet A) range as its main range. Both of such kinds of lamps may be used in combination or one kind of the lamp may be used to perform curing, and the amount of light can

be adjusted by varying the height of the lamp or the irradiation time of the ultraviolet rays. In addition, the heat-curable adhesive resin may be cured inside an aging chamber or an oven. The temperature for heat-curing is preferably of 25° to 80°, and more preferably of 40° to 60°. And the aging time after curing is preferably of 5 to 7 days.

Hereinafter, the present invention will be described in detail with reference to the preferred embodiments; however, the present invention is not limited to such embodiments.

10 **[Embodiment 1]**

An acrylic-based adhesive resin (AT-5910; Samwon) of 59.81 parts by weight, an isocynate-based curing agent (A-20; Samwon) of 0.19 parts by weight, a melamine-based cross-linking agent (SM-20; Samwon) of 1.18 parts by weight, and an ethyl acetate solvent of 38.82 parts by weight per 100 parts by weight of total composition are mixed to prepare a heat-curable adhesive composition. Then, the adhesive composition is used to coat on a polyimide film (LN100 by Kolon; 25 μm), which is a heat-resistant substrate, into a thickness of 6 μm and is dried. Next, the adhesive layer is cured through aging process at 50°C to produce an adhesive tape or sheet.

[Embodiment 2]

An acrylic-based adhesive resin (AT-311; Samwon) of 47.1 parts by weight, an isocynate-based curing agent (A-20; Samwon) of 1.7 parts by weight, a urethane-based acrylate (EB280; Cytec) which is an energy-beam curable oligomer of 3 parts by weight, a 2,4,6-trimethylbenzoyl-diphenyl phosphine (Darocur TPO; Ciba) which is an ultraviolet initiator of 0.05 parts by weight, a hydroxycyclohexyl phenylketone (Irgacure184; Ciba) which is an ultraviolet initiator of 0.05 parts by weight, and an ethyl acetate solvent of 48.1 parts by weight per 100 parts by weight of total composition are mixed to prepare an ultraviolet- and heat-curable adhesive

composition. Then, the adhesive composition is used to coat on a polyimide film (25NPI by Kaneka; 25 μm), which is a heat-resistant substrate, into a thickness of 8 μm and is dried. Next, the adhesive layer is cured through the irradiation of ultraviolet rays (amount of irradiation of ultraviolet rays: about 800mJ/cm²) and aging process at 50°C to produce an adhesive tape or sheet.

[Embodiment 3]

An acrylic-based adhesive resin (AT-5910; Samwon) of 48.58 parts by weight, an isocyanate-based curing agent (A-20; Samwon) of 1.62 parts by weight, a urethane-based acrylate (EB280; Cytec) which is an energy-beam curable oligomer of 2.88 parts by weight, a phenyl novolak-based acrylate (EB9656; Cytec) which is an energy-beam curable oligomer of 3.7 parts by weight, a 2,4,6-trimethylbenzoyl-diphenyl phosphine (Darocur TPO; Ciba) which is an ultraviolet initiator of 0.10 parts by weight, a hydroxycyclohexyl phenylketone (Irgacure184; Ciba) of 0.09 parts by weight, and an ethyl acetate solvent of 43.03 parts by weight per 100 parts by weight of total composition are mixed to prepare an ultraviolet- and heat-curable adhesive composition. Then, the adhesive composition is used to coat on a polyimide film (LN100 by Kolon; 25 μm), which is a heat-resistant substrate, into a thickness of 6 μm and is dried. Next, the adhesive layer is cured through the irradiation of ultraviolet rays (amount of irradiation of ultraviolet rays: about 800mJ/cm²) and aging process at 50°C to produce an adhesive tape (or sheet).

The components and the amount of each component of the adhesive composition that is used in the above Embodiments 1 to 3 are shown in the Table 1 below.

[Table 1]

Category		Weight ratio		
		Embodiment 1	Embodiment 2	Embodiment 3
Heat-curable adhesive resin	AT5910	59.81	–	48.58
	AT311	–	47.1	–
Heat-curing agent	A20	0.19	1.7	1.62
	SM20	1.18	–	–
Energy-beam curable acrylic-based oligomer resin	EB280	–	3	2.88
	EB9656	–	–	3.7
Energy-beam initiator	Darocur TPO	–	0.05	0.10
	Irgacure 184	–	0.05	0.09
Solvent	Ethyl acetate	38.82	48.1	43.03
Irradiation amount of ultraviolet rays(mJ/cm ²)		About 800		

(Test Example 1: 180° peel strength measurement I)

Adhesive sheets or tapes of 2.54 cm*15 cm (width*length)
5 were prepared, and the surface of copper foils (Mitsui;
3EC-HTE-AT) which would be used as objects to be adhered was
washed using methylethylketone or acetone. Then, respective
adhesive sheets were deposited upon respective copper foils
by rolling a rubber roller (about 2kg) with two times of
10 reciprocating movement. Right after that, samples of the copper
foil and adhesive sheet unit were kept on a plate at 130 °C,
and silicone rubbers were put on top thereof for 10 minutes
to heat. Finally, the samples were kept at room temperature
for 30 minutes, and then 180° peel strength was measured for
15 the samples at the speed of 300 mm/min.

(Test Example 2: 180° peel strength measurement II)

Adhesive sheets or tapes of 2.54 cm*15 cm (width*length)
were prepared, and the surfaces of copper foils (Mitsui;

3EC-HTE-AT), stainless steel plates and glass plates which would be used as objects to be adhered were washed using methylethylketone or acetone. Then, respective adhesive sheets were deposited upon respective objects to be adhered
5 by rolling a rubber roller (about 2kg) with one reciprocating movement to produce samples with different objects to be adhered. Right after that, the samples were kept at room temperature for 30 minutes, and then 180° peel strength was measured for the samples at the speed of 300 mm/min.

10 **(Test Example 3: peeling property measurement)**

The existence of adhesive residues which might have produced by the adhesive sheet was checked for the surfaces of the copper foils, stainless steel plates and glass plates whose peel strength had been measured (180° peel strength
15 measurement I and II), through the surface inspection with naked eyes. If a sample had no residues on the surface thereof other than the adhesive residues formed along the edges of the adhesive tape or sheet, then the sample was considered "normal", and if a sample had residues on the surface thereof,
20 then the sample was considered "not normal".

(Test Example 4: chemical resistance measurement)

This test example is a MEK rubbing test using ASTM D4213. For the test, the adhesive compositions of Embodiments 1, 2 and 3 were coated on a steel plate into a thickness of 20 μm
25 and were dried to form adhesive layers. Then, the adhesive layers were cured through the irradiation of ultraviolet rays (amount of irradiation of ultraviolet rays: about 800mJ/cm²) and aging process at 50°C to produce test samples. The cured samples produced as such were kept for three days at 45°C,
30 and were rubbed with a piece of gauze soaked with MEK. The number of reciprocative rubbing movement was measured for when the cured samples began to show the underlying steel plate due to the dissolution of adhesive by MEK, as one reciprocative

rubbing movement was considered '1' for the number of reciprocative rubbing movement.

The heat resistant adhesive sheets produced in the above Embodiments 1 to 3 were deposited on the objects to be adhered, and were measured for peel strength according to the '180° peel strength measurement I and II'. The results are shown in Table 2 below.

[Table 2]

Substrate	Peel strength measurement	180° Peel strength (g·f/2.54cm)			
		Embodiment 1	Embodiment 2	Embodiment 3	Remark
Copper	I	475.45	378.56	159.43	130℃ X 10min
Glass	II	68.45	56.98	34.35	25℃
Stainless steel	II	95.47	74.45	40.56	25℃
Copper	II	107.46	86.42	51.13	25℃

As can be seen from the Table 2, though the samples which have been kept at room temperature have a peel strength of 110 g·f/2.54 cm depending on the objects to be adhered, the samples which have been heated at 130℃ for 10 minutes have a peel strength of 150 to 480 g·f/2.54 cm, which shows the increase of adhesive strength. The results of Embodiments 1 to 3 in Table 2 show the comparison of peel strength depending on the amount of the energy-beam curable acrylic-based oligomer resin. No energy-beam curable acrylic-based oligomer resin was used in Embodiment 1; however, 6.3 parts by weight and 13.5 parts by weight per 100 parts by weight of the heat-curable adhesive resin were used respectively in Embodiments 2 and 3. As a result, it is found that the peel strength decreases due to higher internal cohesion of the adhesive layer as the amount of the energy-beam curable acrylic-based oligomer resin increases.

Next, after the measurements of peel strength for the samples of the above Embodiments 1 to 3 according to '180° peel strength measurement', the peeling property was checked for the surfaces of the copper foils, glass plates and stainless steel plates from which the adhesive sheets (or tapes) were separated, by inspecting the surfaces with eyes. The results are shown in Table 3 below. In Table 3, "O" represents a 'normal' sample which does not have adhesive residues on the surface thereof.

10 [Table 3]

Substrate	Peel strength measurement	Existence of adhesive residues (Normal: O / Not-normal: X)			
		Embodiment 1	Embodiment 2	Embodiment 3	Remark
Copper	I	O	O	O	130℃ X 10min
Glass	II	O	O	O	25℃
Stainless steel	II	O	O	O	25℃
Copper	II	O	O	O	25℃

As can be seen from Table 3, none of the samples have adhesive residues on the surface thereof. Thus, it is found that the above Embodiments have an excellent peeling property, and especially that the sample which had been heated (the sample from '180° peel strength measurement I') shows the existence of internal cohesion.

Next, the results of chemical resistance measurement according to the above Test Example 4 are shown in Table 4 below.

[Table 4]

Chemical resistance measurement	Embodiment 1	Embodiment 2	Embodiment 3
	100 times or higher	140 times or higher	250 times or higher

As can be seen from the above Table 4, the number of times of reciprocative rubbing movement increases from Embodiment 1 (100 times or higher) to Embodiment 3 (250 times or higher) as a result of rubbing the cured test samples with constant force. No energy-beam curable acrylic-based oligomer resin was used in Embodiment 1; however, 6.3 parts by weight and 13.5 parts by weight per 100 parts by weight of the heat-curable adhesive resin were used respectively in Embodiments 2 and 3. Consequently, it is found that the chemical resistance is enhanced due to higher internal cohesion of the adhesive layer as the amount of the energy-beam curable acrylic-based oligomer resin increases.

As described above, when the amount of the energy-beam curable acrylic-based oligomer resin to be used is in the range of 1 to 20 parts by weight per 100 parts by weight of heat-curable acrylic-based adhesive resin in the adhesive composition of the adhesive sheet for plating according to the present invention, high chemical resistance can be secured during plating and no residues stick on the surface of an object to be adhered during the peeling process, thereby ensuring excellent reliability and workability. In particular, when very high chemical resistance is required for an adhesive sheet for a special situation, a cross-link structure by interpenetration can be enhanced further by increasing the amount of the energy-beam curable acrylic-based oligomer resin to be used, thereby improving cohesive strength and chemical resistance.

The invention has been described in detail with particular reference to examples and embodiments thereof among various embodiments that had been carried out by the present inventors, but it will be understood that variations and modifications can be effected by those skilled in the art without departing from the spirit and scope of the invention.

Claims

1. An adhesive sheet for plating *comprising*:
a substrate; and
5 an adhesive layer formed on at least one side of the substrate, the adhesive layer being coated with an adhesive composition containing a heat-curable acrylic-based adhesive resin, and a heat-curing agent cross linked with an energy-beam curable acrylic-based oligomer resin and an
10 energy-beam initiator.
2. The adhesive sheet for plating of Claim 1, *wherein* the substrate is at least one film selected from polyester,
15 polyimide, polyamide, polyether sulfone, polyphenylene sulfide, polyether ketone, polyether ether ketone, triacetyl cellulose, polyether imide, polyethylene naphthalate, polypropylene and polycarbonate.
- 20 3. The adhesive sheet for plating of Claim 1, *wherein* the substrate is at least one metal foil selected from a foil, an alloy foil and a plated foil consisting of aluminium, magnesium, titanium, chromium, manganese, iron, nickel, zinc or tin.
- 25 4. The adhesive sheet for plating of Claim 1, *wherein* the heat-curable adhesive resin has a weight average molecular weight of 40,000~3,000,000.
- 30 5. The adhesive sheet for plating of Claim 1, *wherein* one or more kinds of the heat-curing agents in combination are used according to design purposes, and the amount of the heat-curing agent to be used is 1 to 20 parts by weight per 100 parts by

weight of the heat-curable adhesive resin.

6. The adhesive sheet for plating of Claim 1, wherein one or more kinds of the energy-beam curable acrylic-based oligomer resin in combination are used according to design purposes, and the amount of the energy-beam curable acrylic-based oligomer resin to be used is 1 to 20 parts by weight per 100 parts by weight of the heat-curable adhesive resin.

7. The adhesive sheet for plating of Claim 1, wherein one or more kinds of the energy-beam initiator in combination are used according to design purposes, and the amount of the energy-beam initiator to be used is 1 to 20 parts by weight per 100 parts by weight of the energy-beam curable acrylic-based oligomer resin.

8. The adhesive sheet for plating of Claim 1, further comprising a copper foil on which said adhesive sheet is deposited, wherein said adhesive sheet having an adhesive strength of 150 g·f/2.54cm(width) to 480 g·f/2.54 cm (width) after said adhesive sheet is heated for 10 minutes at 130°C , and is kept at room temperature for 30 minutes.