Claims

[Claim 1]
A method for forming a photo-cured product pattern, comprising:
forming an adhesion layer by applying an adhesion layer composition onto a substrate;
applying a photocurable composition to the substrate having the adhesion layer;
bringing the photocurable composition into contact with a mold having an original pattern to be transferred;
irradiating the photocurable composition with light to form a photo-cured product; and
removing the mold from the photo-cured product;
wherein the adhesion layer composition comprises:
a compound (A) containing at least two binding functional groups including at least one functional group directly bound to a hydrocarbon or an aromatic hydrocarbon and capable of being bound to the substrate, and at least one functional group directly bound to a hydrocarbon or an aromatic hydrocarbon and capable of being bound to the photocurable composition; and
a solvent (B),
wherein the functional group capable of being bound to the substrate is at least one selected from the group consisting of hydroxy, carboxy, thiol, amino, epoxy, and (blocked) isocyanate,
wherein the functional group capable of being bound to the photocurable composition is a hydrogen donating functional group selected from thiol or alkylamino; and
wherein the functional group capable of being bound to the substrate and the functional group capable of being bound to the photocurable composition are not directly bound to a heterocyclic ring containing nitrogen and an unsaturated bond.

[Claim 2]
The method according to Claim 1, wherein the compound (A) contains at least three hydrogen donating functional groups in the molecule thereof.

[Claim 3]
The method according to Claim 1 or Claim 2, wherein the functional group capable of being bound to the substrate is at least one of hydroxy and thiol.

[Claim 4]
The method according to any one of Claims 1 to 3, wherein the compound (A) has no heterocyclic structure.

[Claim 5]

The method according to Claim 1, wherein the compound (A) has straight chains extending in four directions, each end of which is bound to the functional group capable of being bound to the substrate or the functional group capable of being bound to the photocurable composition.

[Claim 6]
The method according to any one of Claims 1 to 5, wherein the compound (A) contains at least four thiol groups in the molecule thereof.

[Claim 7]
The method according to any one of Claims 1 to 3, wherein the compound (A) is at least one selected from the group consisting of 1,3,5-tris(3-mercaptobutyryloxyethyl)-1,3,5-triazine-2,4,6(1H,3H,5H)-trione, trimethylolpropane tris(3-mercaptopropionate), pentaerythritol tetrakis(3-mercaptobutylate), pentaerythritol tris(3-mercaptobutylate), pentaerythritol tetrakis(3-mercaptopropionate), N-phenylglycine, and N,N,N',N",N"-pentakis(2-hydroxypropyl)diethylenetriamine.

[Claim 8]
The method according to any one of Claims 1 to 4, wherein the solvent (B) is propylene glycol monomethyl ether acetate or contains propylene glycol monomethyl ether acetate.

[Claim 9]
The method according to any one of Claims 1 to 5, wherein the photocurable composition contains a polymerizable compound and a photopolymerization initiator.

[Claim 10]
The method according to Claim 9, wherein the polymerizable compound is (meth)acrylate monomer.

[Claim 11]
The method according to any one of Claims 1 to 10, wherein the photocurable composition contains benzyl (meth)acrylate.

[Claim 12]
The method according to any one of Claims 1 to 11, wherein the photocurable composition contains an internal releasing agent.

[Claim 13]
The method according to any one of Claims 1 to 12, wherein the substrate has a hydroxy group at the surface thereof.

[Claim 14]
The method according to any one of Claims 1 to 13, wherein the mold is made of quartz.

[Claim 15]
A method for manufacturing an optical component, the method comprising:
forming a patterned film on a substrate by the method as set forth in any one of Claims 1 to 14.

[Claim 16]
A method for manufacturing an optical component, the method comprising:
forming a patterned film by the method as set forth in any one of Claims 1 to 14; and
working the substrate by etching or ion implantation using the patterned film as a mask.

[Claim 17]
A method for manufacturing a circuit board, the method comprising:
forming a patterned film by the method as set forth in any one of Claims 1 to 14;
working the substrate by etching or ion implantation using the patterned film as a mask; and
forming an electronic member.

[Claim 18]
The method according to Claim 17, wherein the circuit board is a semiconductor element.

[Claim 19]
A method for manufacturing an electronic apparatus, the method comprising:
preparing a circuit board by the method as set forth in Claim 17 or 18; and
connecting the circuit board to a control mechanism configured to control the circuit board.

[Claim 20]
The method for forming a patterned film according to any one of Claims 1 to 14, wherein the bringing of the photocurable composition into contact is performed in an atmosphere containing a condensable gas.

[Claim 21]
The method according to Claim 20, wherein the condensable gas is

1,1,1,3,3-pentafluoropropane.

[Claim 22]
The method according to Claim 20 or 21, wherein the atmosphere containing a condensable gas is a mixture of helium gas and the condensable gas.

[Claim 23]
A method for manufacturing an imprint mold, the method comprising:
forming a photo-cured product pattern on a substrate by the method as set forth in any one of Claims 1 to 14; and
etching the substrate using the photo-cured product pattern.