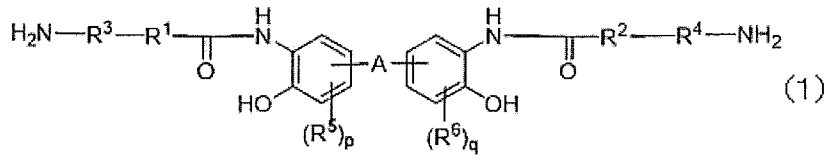
CLAIMS

1. A di-amine compound represented by the general formula (1):



(1)

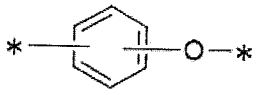
(wherein in the general formula (1), R^1 and R^2 each are a divalent aliphatic group;

R^3 is a divalent organic group represented by the formula (4) and R^4 is a divalent organic group represented by the formula (5),

R^5 and R^6 each are a hydrogen atom, a halogen atom, a hydroxyl group, a nitro group, a cyano group, an aliphatic group, an aromatic group, an acetyl group, a carboxyl group, or an organic group having any of an ester group, an amide group, an imide group, and a urea group;

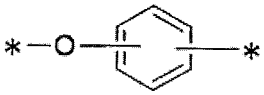
A is $-SO_2-$, $-CH_2-$, $-C(CH_3)_2-$ or $-C(CF_3)_2-$ (wherein F is fluorine);

p and q each are an integer number in the range of 0 to 3,



(4)

(wherein in the general formula (4), * indicates a chemical bond,)

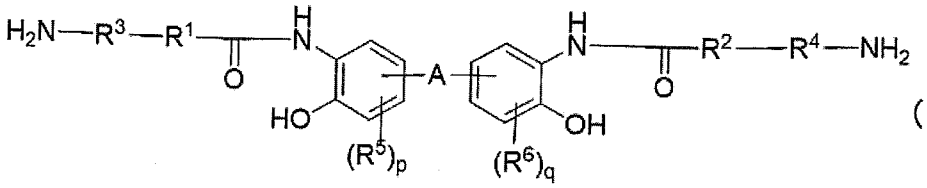


(5)

(wherein in the general formula (5), * indicates a chemical bond).

2. The di-amine compound according to claim 1, which is represented by the general formula (1), wherein R^1 and R^2 in the general formula (1) each are independently a divalent aliphatic group represented by the general formula (2) or the general formula (3),

[Chem 2]



(1)

(wherein in the general formula (1), R^3 and R^4 each are a divalent aliphatic group, aliphatic ring group, aromatic group,

a divalent organic group in which an aromatic group is bonded by -O-, -CO-, $-SO_2-$, $-CH_2-$, $-C(CH_3)_2-$ or $-C(CF_3)_2-$ (wherein F is fluorine),

a divalent organic group in which two or more aromatic groups are bonded by a single bond,

or a divalent organic group in which two or more aromatic groups are bonded by -O-, -CO-, $-SO_2-$, $-CH_2-$, $-C(CH_3)_2-$ or $-C(CF_3)_2-$ (wherein F is fluorine);

R^5 and R^6 each are a hydrogen atom, a halogen atom, a hydroxyl group, a nitro group, a cyano group, an aliphatic group, an aromatic group, an acetyl group, a carboxyl group, or an organic group having any of an ester group, an amide group, an imide group, and a urea group;

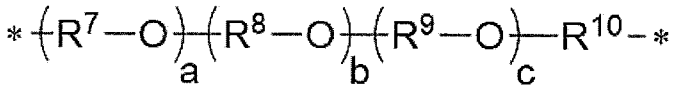
A is a divalent aliphatic group, aliphatic ring group, aromatic group, a divalent organic group in which two or more aromatic groups are bonded by a single bond,

or a divalent organic group in which two or more aromatic groups are

bonded by -O-, -S-, -CO-, -SO_2-, -CH_2-, -$C(CH_3)_2$- or -$C(CF_3)_2$- (wherein F is fluorine);

p and q each are an integer number in the range of 0 to 3),

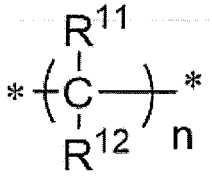
[Chem 3]



(2)

(wherein in the general formula (2), R^7 to R^{10} each are independently a C_1-C_{10} alkylene group, and each of a, b and c is an integer number in the range of $1 \leq a \leq 20$, $0 \leq b \leq 20$, and $0 \leq c \leq 20$, and the arrangement of the repeating units may be in a block way or in a random way, and * indicates a chemical bond),

[Chem 4]



(3)

(wherein in the general formula (3), R^{11} and R^{12} each are independently hydrogen, fluorine, or a C_1-C_6 alkyl group, and n is an integer number of 1 to 20, and * indicates a chemical bond).

3. A heat-resistant resin having a structure derived from said

di-amine compound according to claim 1 or 2.

4. The heat-resistant resin according to claim 3, comprising at least one kind selected from the group consisting of polyimides, polyamides, polybenzoxazoles, polybenzimidazoles, polybenzothiazoles, precursors thereof, and copolymers thereof.

5. A resin composition comprising said heat-resistant resin according to claim 3 or 4, (b) a photosensitive compound and (c) a solvent.

6. The resin composition according to claim 5, further comprising (d) a compound having two or more of at least one of an alkoxymethyl group and a methylol group.

7. A resin sheet formed of said resin composition according to claim 5 or 6.

8. A cured film obtained by curing said resin composition according to claim 5 or 6.

9. A cured film obtained by curing said resin sheet of claim 7.

10. A method of producing a relief pattern of a cured film, comprising the steps of coating said resin composition according to claim 5 or 6 on a substrate or laminating said resin sheet according to claim 7 on a substrate, and drying said resin composition or said resin sheet to form a resin film;

exposing said resin film through a mask;

eluting or removing irradiated portion by an alkali solution to develop said resin film; and

and heat-treating said resin film after the development.

11. The method of producing a relief pattern of a cured film according to claim 10, wherein said step of coating said resin composition on a

substrate and drying said resin composition to form said resin film comprises a step of coating said resin composition on a substrate using a slit nozzle.

12. An organic EL display device, wherein said cured film according to claim 8 or 9 which is patterned or not patterned is arranged in one or both of a planarizing layer and a dielectric layer of a first electrode of a driving circuit.

13. An electronic component or a semiconductor apparatus, wherein said cured film according to claim 8 or 9 patterned or not pattered is arranged between rewires as an interlayer dielectric film.

14. The electronic component or a semiconductor apparatus according to claim 13, wherein said rewires are copper metal wires, and the width of said copper metal wires and the distance between adjacent wires are 5 μm or less.

15. An electronic component or a semiconductor apparatus, wherein said cured film according to claim 8 or 9 patterned or not patterned is arranged between rewires as an interlayer dielectric film on an encapsulation resin substrate on which a silicon chip has been arranged.

16. The semiconductor electronic component or the semiconductor apparatus according to any one of claims 13 to 15, wherein said rewires are copper metal wires and are connected with a semiconductor chip via a bump.

17. The semiconductor electronic component or the semiconductor apparatus according to any one of claims 13 to 16, wherein, for said rewires, the width of metal wires and the distance between adjacent wires get thinner as the wires get closer to said semiconductor chip.

18. The semiconductor electronic component or the semiconductor

apparatus according to any one of claims 13 to 17, wherein the thickness of said interlayer dielectric film arranged between said rewires gets thinner as said interlayer dielectric film gets closer to said semiconductor chip.

19. A method of producing an electronic component or a semiconductor apparatus, comprising the steps of arranging said cured film according to claim 8 or 9 on a support substrate on which a temporary attachment material has been arranged as an interlayer dielectric film between rewires;

arranging a silicon chip and an encapsulation resin thereon; and,

detaching said support substrate on which said temporary attachment material has been arranged and said rewires.