CLAIMS

1. An alkali-soluble resin (A) comprising a structure represented by a general formula (1),

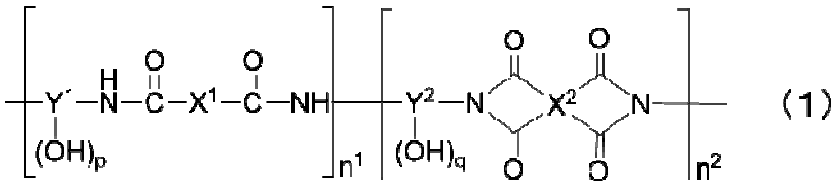
wherein X^1 represents a divalent organic group having 2 to 100 carbon atoms, Y^1 and Y^2 each represent a divalent to hexavalent organic group having 2 to 100 carbon atoms, X^2 represents a tetravalent organic group having 2 to 100 carbon atoms, p and q each represent an integer in a range of 0 to 4, and n^1 and n^2 each represent an integer in a range of 5 to 100,000,

wherein (I) and (II) described below are satisfied:

(I) a divalent organic group having an aliphatic chain having 8 to 30 carbon atoms is contained as X^1 of the general formula (1) at a content of 30 to 70 mol% based on 100 mol% of a total of X^1 and X^2, and

(II) an organic group having a diphenyl ether structure is contained as Y^1 of the general formula (1) at a content of 1 to 30 mol% based on 100 mol% of a total of Y^1 and Y^2.

[Chem. 1]



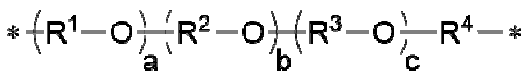
(1)

2. The alkali-soluble resin (A) according to claim 1, wherein (III) described below is further satisfied:

(III) n^1 and n^2 of the general formula (1) satisfy n^1/n^2 = 10 to 20.

3. The alkali-soluble resin (A) according to claim 1 or 2, wherein a polyether structure represented by a general formula (2) is contained as Y^1 or Y^2 of the general formula (1) at a content of 1 to 20 mol% based on 100 mol% of the total of Y^1 and Y^2,

[Chem. 2]



(2)

the general formula (2) shown above wherein R^1 to R^4 each independently represent an alkylene group having 2 to 10 carbon atoms, a, b, and c represent an integer in a range of $1 \leq a \leq 20$, an integer in a range of $0 \leq b \leq 20$, and an integer in a range of $0 \leq c \leq 20$ respectively, a sequence of repeating units is in a block manner or in a random manner, and * represents a chemical bond.

4. A photosensitive resin composition comprising:

the alkali-soluble resin (A) according to any one of claims 1 to 3;

a photosensitizer (B); and

a solvent (C).

5. The photosensitive resin composition according to claim 4, wherein a compound (D) having a boiling point of 150 to 250°C, a melting point of -30°C or less, and a molecular weight of 100 or more is contained at a content of 0.1 to 50 parts by mass among 100 parts by mass of the solvent (C).

6. The photosensitive resin composition according to claim 5, wherein the compound (D) is a compound (D-2) having a boiling point of 150 to 250°C, a melting point of -45°C or less, and a molecular weight of 100 or more.

7. The photosensitive resin composition according to any one of claims 4 to 6, wherein the alkali-soluble resin (A) contains a polyhydroxyamide having a polybenzoxazole precursor structure, and the polyhydroxyamide cured at a temperature of 200°C has a ring closure rate of 0 to 60%.

8. A photosensitive sheet comprising the photosensitive resin composition according to any one of claims 5 to 7.

9. The photosensitive sheet according to claim 8,

wherein the alkali-soluble resin (A) contains a polyhydroxyamide having a polybenzoxazole precursor structure, and the polyhydroxyamide cured at a temperature of 200°C has a ring closure rate of 0 to 60%.

10. A cured film comprising the photosensitive resin composition according to any one of claims 4 to 7 that is cured, or the photosensitive sheet according to claim 8 or 9 that is cured.

11. The cured film according to claim 10, wherein the compound (D) is contained at a content of 0.05 to 5,000 ppm.

12. An interlayer insulating film or a semiconductor protective film, comprising the cured film according to claim 10 or 11.

13. A method for producing a relief pattern of a cured film, the method comprising the steps of:

applying the photosensitive resin composition according to any one of claims 4 to 7 on a substrate, or laminating a substrate with the photosensitive sheet according to claim 8 or 9, and drying the photosensitive resin composition or the photosensitive sheet to form a photosensitive resin film on the substrate;

exposing the photosensitive resin film to light through a mask;

removing an exposed portion or an unexposed portion of the photosensitive resin film with an alkaline solution to develop the photosensitive resin film; and

heat-treating the developed photosensitive resin film to obtain a cured film.

14. An electronic component or a semiconductor device, comprising a layer in which the cured film according to claim 10 or 11 is placed.

15. An electronic component or a semiconductor device, comprising:

redistribution lines; and

the cured film according to claim 10 or 11 that is placed as an interlayer insulating film between the redistribution lines.

16. The electronic component or the semiconductor device according to claim 15, wherein the redistribution line is a copper metal line, and a width of the copper metal line and a distance between adjacent copper metal lines are 5 μm or less.

17. An electronic component or a semiconductor device, comprising:

a sealing resin substrate;

a silicon chip that is placed on the sealing resin substrate;

redistribution lines; and

the cured film according to claim 10 or 11 that is placed, as an interlayer insulating film between the redistribution lines, on the sealing resin substrate.