resin composition is increased, the viscosity becomes excessively high.

[0004]

The viscosity of the resin composition can be reduced by using a good solvent for the resin or a solvent having a low viscosity in itself. The polyimide and polyimide precursor have a rigid structure, and therefore often have low solubility in various solvents. There have been proposed polyimides having improved solubility in organic solvents (see, for example, Patent Document 1) and polyimide precursors having improved solubility in organic solvents (see, for example, Patent Documents 2 and 3). However, even these resins have insufficient solubility in organic solvents. Further, resin compositions having a viscosity suitable for slit coating cannot be obtained from these resins.

PRIOR ART DOCUMENTS

[0005]

PATENT DOCUMENTS

Patent Document 1: Japanese Patent Laid-open Publication No. 2005-41936

Patent Document 2: Japanese Patent Laid-open Publication No. 2011-42701

Patent Document 3: Japanese Patent Laid-open Publication No. 2011-202059

SUMMARY

PROBLEMS TO BE SOLVED

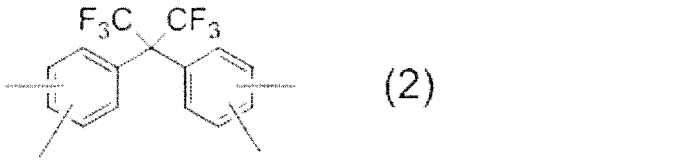
[0006]

In view of the above-described problems, an object of the embodiments disclosed herein is to provide a photosensitive resin composition which contains a polyimide precursor having high solubility in an organic solvent, has a low viscosity and hence excellent coatability, thus ensures formation of a film with a uniform thickness, and has high pattern processability.

SOLUTIONS TO THE PROBLEMS

[0007]

That is, the present disclosure provides a photosensitive resin composition including: an aromatic amide resin (a1) which has an amide group, a trifluoromethyl group and an aromatic ring and which is soluble in propylene glycol monomethyl ether acetate; a photosensitive agent (b); and a solvent (c), wherein the photosensitive resin composition has a solid content of 20% by weight and a viscosity of 1 to 15 cp at 25°C; or a photosensitive resin composition including: an aromatic amide resin (a2) which has an amide group, an amide acid ester, a trifluoromethyl group and an aromatic ring and which is soluble in propylene glycol monomethyl ether acetate; a photosensitive agent (b); and a solvent (c), wherein the photosensitive resin composition has a solid content of 20% by weight and a viscosity of 1 to 15 cp at 25°C; or a photosensitive resin composition including: a resin (a) having as a main repeating unit a



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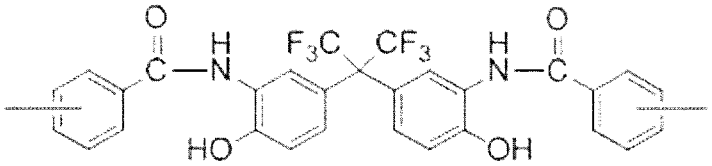

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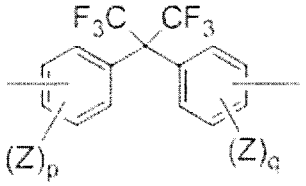


(4)

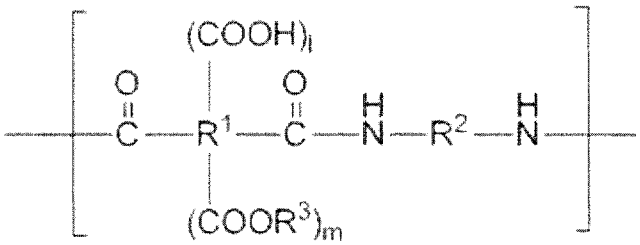
[0011]

(in the general formula (4), Z represents a hydroxyl group or a methyl group, and p and q each represent 0 or 1).

[0011a]

In an aspect, there is provided a photosensitive resin composition comprising: a resin (a) having as a main repeating unit a structure represented by the general formula (1); a photosensitive agent (b); and a solvent (c):

[Chemical compound 1]

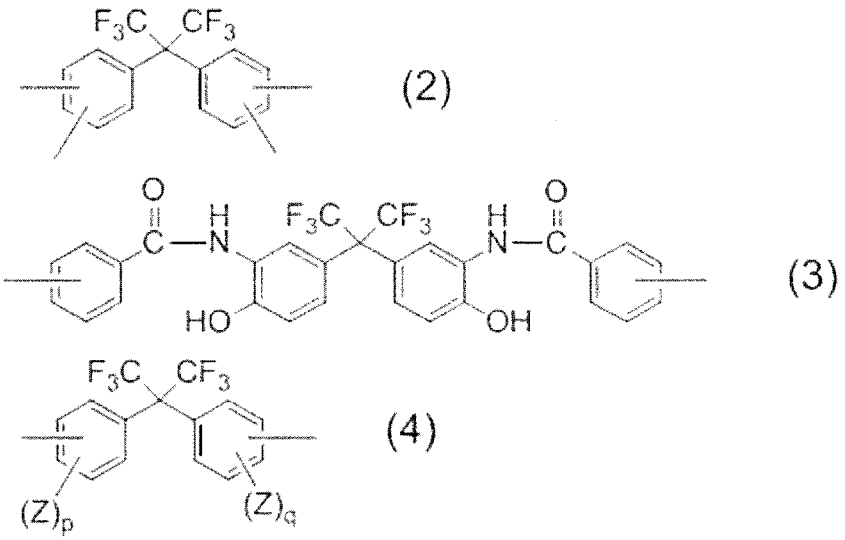


(1)

wherein different groups may exist as each of R^1 to R^3 in a

plurality of repeating units; R^1 is a tetravalent organic group, where 95 to 100 mol% of R^1 in all the repeating units is a group represented by the following formula (2); R^2 is a divalent organic group, where 50 to 99 mol% of R^2 in all the repeating units is a group represented by the following formula (3), and 1 to 50 mol% of R^2 in all the repeating units is a group represented by the following formula (4); R^3 represents an organic group with a carbon number of 1 to 20; and l and m each represent an integer of 0 to 2, where l + m = 2; and

[Chemical compound 2]



wherein, Z represents a hydroxyl group or a methyl group, and p and q each represent 0 or 1.

[0011b]

The present disclosure also provides a method for producing a heat-resistant resin film, the method including the steps of: applying a photosensitive resin composition as defined above to a substrate to form a photosensitive resin film; drying the photosensitive resin film;

exposing the dried photosensitive resin film; developing the exposed photosensitive resin film; and subjecting the developed photosensitive resin film to a heating treatment, wherein using a coating apparatus fed with a photosensitive resin composition other than the photosensitive resin composition as defined above, the photosensitive resin composition as defined above is applied to a substrate without cleaning the inside of a liquid feeding passage of the coating apparatus.

[0011c]

In another aspect, there is provided a method for producing a heat-resistant resin film, the method comprising the steps of: applying a photosensitive resin composition as defined above to a substrate to form a photosensitive resin film; drying the photosensitive resin film; exposing the dried photosensitive resin film; developing the exposed photosensitive resin film; and subjecting the developed photosensitive resin film to a heating treatment.

[0011d]

In another aspect, there is provided a method for producing a heat-resistant resin film, the method comprising the steps of: applying a photosensitive resin composition as defined above to a substrate to form a photosensitive resin film; drying the photosensitive resin film; exposing the dried photosensitive resin film; developing the exposed photosensitive resin film; and subjecting the developed photosensitive resin film to a heating

treatment, wherein using a coating apparatus fed with a photosensitive resin composition other than the photosensitive resin composition as defined above, the photosensitive resin composition as defined above is applied to a substrate without cleaning the inside of a liquid feeding passage of the coating apparatus.

[0011e]

In another aspect, there is provided a display device comprising: a first electrode formed on a substrate; an insulation layer formed on the first electrode so as to partially expose the first electrode; and a second electrode provided so as to face the first electrode, wherein the insulation layer is a heat-resistant resin film obtained by the method for producing a heat-resistant film as defined above.

[0011f]

In another aspect, there is provided a display device comprising: a planarizing film provided so as to cover irregularities on a substrate provided with a thin-film transistor (TFT); and a display element provided on the planarizing film, wherein the planarizing film is a heat-resistant resin film obtained by the method for producing a heat-resistant film as defined above.

EFFECTS

[0012]

According to the present disclosure, there can be provided a photosensitive resin composition which contains a polyimide precursor having high solubility in an organic solvent, has a low viscosity and hence excellent coatability, thus ensures formation of a film with a uniform thickness, and has high pattern processability.

EMBODIMENTS OF THE INVENTION

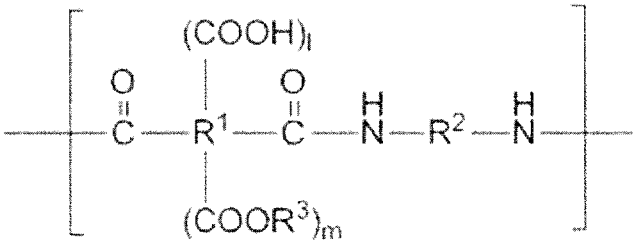
[0013]

The photosensitive resin composition of the present invention is a photosensitive resin composition including: an aromatic amide resin (a1) which has an amide group, a trifluoromethyl group and an aromatic ring and which is soluble in propylene glycol monomethyl ether acetate; a photosensitive agent (b); and a solvent (c), wherein the photosensitive resin composition has a solid content of 20% by weight and a viscosity of 1 to 15 cp at 25°C; or a photosensitive resin composition including: an aromatic amide resin (a2) which has an amide group, an amide acid ester, a trifluoromethyl group and an aromatic ring and which is soluble in propylene glycol monomethyl ether acetate; a photosensitive agent (b); and a solvent (c), wherein the photosensitive resin composition has a solid content of 20% by weight and a viscosity of 1 to 15 cp at 25°C; or a photosensitive resin composition including: a resin (a) having

CLAIMS

1. A photosensitive resin composition comprising: a resin (a) having as a main repeating unit a structure represented by the general formula (1); a photosensitive agent (b); and a solvent (c):

[Chemical compound 1]

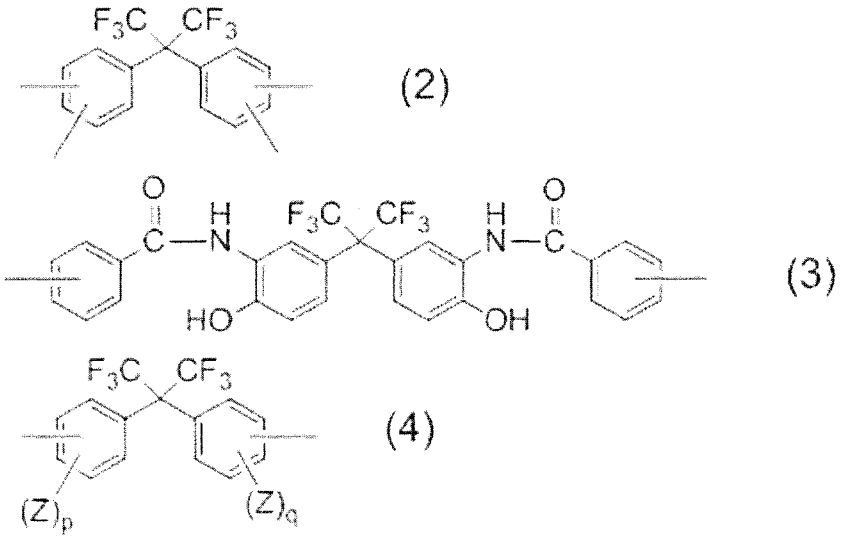


(1)

wherein different groups may exist as each of R^1 to R^3 in a

plurality of repeating units; R^1 is a tetravalent organic group, where 95 to 100 mol% of R^1 in all the repeating units is a group represented by the following formula (2); R^2 is a divalent organic group, where 50 to 99 mol% of R^2 in all the repeating units is a group represented by the following formula (3), and 1 to 50 mol% of R^2 in all the repeating units is a group represented by the following formula (4); R^3 represents an organic group with a carbon number of 1 to 20; and l and m each represent an integer of 0 to 2, where l + m = 2; and

[Chemical compound 2]



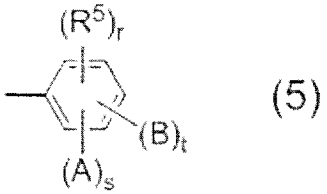
wherein, Z represents a hydroxyl group or a methyl group, and p and q each represent 0 or 1.

2. The photosensitive resin composition according to claim 1, wherein the resin (a) having as a main repeating unit a structure represented by the general formula (1) is end-capped with 10 to 100 mol% of a monoamine based on 100 mol% of a tetracarboxylic acid as a monomer component.

3. The photosensitive resin composition according to claim 1, wherein the resin (a) having as a main repeating unit a structure represented by the general formula (1) is end-capped with 10 to 100 mol% of an acid anhydride based on 100 mol% of a diamine as a monomer component.

4. The photosensitive resin composition according to claim 2, wherein the monoamine is a monoamine having a group represented by the general formula (5):

[Chemical compound 3]



(5)

wherein, R^5 represents an unsaturated hydrocarbon group with a carbon number of 1 to 6, and r represents 0 or 1; A and B may be the same or different, and each represent a hydroxyl group, a carboxyl group or a sulfonic acid group; and s and t each represent 0 or 1, where $s+t \geq 1$.

5. The photosensitive resin composition according to any one of claims 1 to 4, wherein the photosensitive agent (b) is a quinone diazide compound.

6. A method for producing a heat-resistant resin film, the method comprising the steps of: applying a photosensitive resin composition according to any one of claims 1 to 5 to a substrate to form a photosensitive resin film; drying the photosensitive resin film; exposing the dried photosensitive resin film;

developing the exposed photosensitive resin film; and subjecting the developed photosensitive resin film to a heating treatment.

7. A method for producing a heat-resistant resin film, the method comprising the steps of: applying a photosensitive resin composition according to any one of claims 1 to 5 to a substrate to form a photosensitive resin film; drying the photosensitive resin film; exposing the dried photosensitive resin film; developing the exposed photosensitive resin film; and subjecting the developed photosensitive resin film to a heating treatment, wherein using a coating apparatus fed with a photosensitive resin composition other than the photosensitive resin composition according to any one of claims 1 to 5, the photosensitive resin composition according to any one of claims 1 to 5 is applied to a substrate without cleaning the inside of a liquid feeding passage of the coating apparatus.

8. The method for producing a heat-resistant resin film according to claim 7, wherein the photosensitive resin composition other than the photosensitive resin composition according to any one of claims 1 to 5 is a photosensitive resin composition containing at least one solvent selected from ethylene glycol monoethyl ether acetate, ethyl-3-ethoxy propionate, methyl-3-methoxy propionate, 2-heptanone, propylene glycol monomethyl ether acetate and cyclohexanone.

9. A display device comprising: a first electrode formed on

a substrate; an insulation layer formed on the first electrode so as to partially expose the first electrode; and a second electrode provided so as to face the first electrode, wherein the insulation layer is a heat-resistant resin film obtained by the method for producing a heat-resistant film according to any one of claims 6 to 8.

10. A display device comprising: a planarizing film provided so as to cover irregularities on a substrate provided with a thin-film transistor (TFT); and a display element provided on the planarizing film, wherein the planarizing film is a heat-resistant resin film obtained by the method for producing a heat-resistant film according to any one of claims 6 to 8.