Patent Document 1: Japanese Patent No. 5953796

Patent Document 2: Japanese Patent No. 5446203

Patent Document 3: International Publication No. 2017/064984

SUMMARY

PROBLEMS TO BE SOLVED

[0009]

However, in the material as described in Patent Document 3, the stress is insufficiently reduced because the cured film has a high elastic modulus.

[0010]

The present disclosure has been made in view of the problems of conventional art as described above, and provides an alkali-soluble resin with which a cured film having high extensibility and a high adhesion property to a metal, and at the same time, having reduced stress due to low elasticity and low shrinkability, and having high heat resistance can be obtained, and a photosensitive resin composition containing the alkali-soluble resin.

SOLUTIONS TO THE PROBLEMS

[0011]

In order to solve the above-described problems, the present disclosure relates to the following.

[0012]

In an aspect, there is provided an alkali-soluble resin (A) including 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,

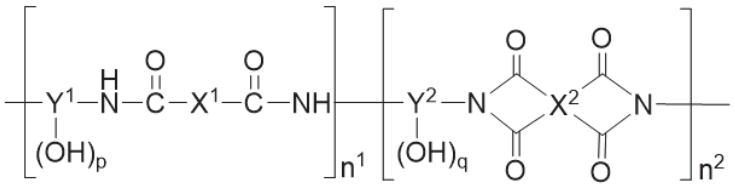
wherein (I) and (II) described below are satisfied:

(I) an 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.

[0013]

[Chem. 1]



(1)

[0013a]

In another aspect, there is provided a photosensitive resin composition comprising:

the alkali-soluble resin (A) as defined above;

a photosensitizer (B); and

a solvent (C).

[0013b]

In another aspect, there is provided a photosensitive sheet comprising the photosensitive resin composition as defined above.

[0013c]

In another aspect, there is provided a cured film comprising the photosensitive resin composition as defined above that is cured, or the photosensitive sheet as defined above that is cured.

[0013d]

In another aspect, there is provided an interlayer insulating film or a semiconductor protective film, comprising the cured film as defined above.

[0013e]

In another aspect, there is provided a method for producing a relief pattern of a cured film, the method comprising the steps of:

applying the photosensitive resin composition as defined above on a substrate, or laminating a substrate with the photosensitive sheet as defined above, 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.

[0013f]

In another aspect, there is provided an electronic component or a semiconductor device, comprising a layer in which the cured film as defined above is placed.

[0013g]

In another aspect, there is provided an electronic component or a semiconductor device, comprising:

redistribution lines; and

the cured film as defined above that is placed as an interlayer insulating film between the redistribution lines.

[0013h]

In another aspect, there is provided 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 as defined above that is placed, as an interlayer insulating film between the redistribution lines, on the sealing resin substrate.

[0014]

EFFECTS

[0015]

The present invention provides an alkali-soluble resin with which a cured film having high extensibility, high adhesion to a metal, reduced stress, and high heat resistance can be obtained, and a photosensitive resin composition containing the alkali-soluble resin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 shows an enlarged section of a pad portion of a semiconductor device having a bump.

Fig. 2 shows a method of preparing a semiconductor device having a bump in detail.

Fig. 3 shows an enlarged section of a pad portion of a semiconductor device having the insulating film according to the present invention.

Fig. 4 shows a section of a coil component having the insulating film according to the present invention.

EMBODIMENTS OF THE INVENTION

[0017]

The present invention is an alkali-soluble resin (A) including a structure represented by a general formula (1)