increased with the aim of producing a cured film with a high glass transition temperature, which is an indicator of thermal characteristics, the resulting cured film tends to be low in tensile strength or tensile elongation, which are indicators of mechanical characteristics. On the other hand, if a flexible component is introduced in order to increase the tensile strength or tensile elongation, the resulting cured film tends to decrease in glass transition temperature. Furthermore, if a conventional polyimide resin or polybenzoxazole resin is added with the aim of improving both mechanical characteristics and thermal characteristics, the functional groups in side chains or terminals tend to impede or excessively enhance the cationic polymerization reaction, making it difficult to realize both high photo-curability and storage stability simultaneously.

MEANS OF SOLVING THE PROBLEMS

[0006]

The present invention, which is designed for solving the above problems, is as described below.

It provides a negative type photosensitive resin composition including a polymer compound (A), a cationic polymerizable compound (B), and a cationic polymerization initiator (C) wherein the component (A) contains at least one compound selected from the group consisting of polyamide, polyimide, polybenzoxazole, precursors thereof, and copolymers thereof, wherein the polyamide is a polyamide that is not a polyimide precursor or a polybenzoxazole precursor, wherein the component (C) is designed to generate an acid when receiving light or heat and promote cationic polymerization and contains a sulfonium salt, the sulfonium salt containing the gallate ion as a counter anion, and wherein both the relations $0.6A \leq B + 0.5C \leq 0.98A$ and $0.05(B + C) \leq C \leq 0.25(B + C)$ are satisfied where A, B and C represent the numbers of moles of all carboxylic acid residues, all diamine residues, and all monoamine residues, respectively, contained in the component (A).

ADVANTAGEOUS EFFECTS OF THE INVENTION

[0007]

The present invention provides a negative type photosensitive resin composition that ensures high aspect ratio pattern processability, high storage stability, and high photo-curability and also provides a cured product with good mechanical characteristics and high heat resistance.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0008]

The negative type photosensitive resin composition according to the present invention includes a polymer compound (A), a cationic polymerizable compound (B), and a cationic polymerization initiator (C), with the component (A) containing at least one compound selected from the group consisting of polyamide, polyimide, polybenzoxazole, precursors thereof, and copolymers thereof, and the negative type photosensitive resin composition also

satisfies both the relations $0.6A \leq B + 0.5C \leq 0.98A$ and $0.05(B + C) \leq C \leq 0.25(B + C)$ where A (moles), B (moles), and C (moles) represent the quantities of all carboxylic acid residues, all diamine residues, and all monoamine residues, respectively, contained in the component (A). Hereinafter, the requirement for the component (A) to contain at least one compound

coating film, etc. When adopting a negative type photosensitive resin composition in the form of a coating film, it is preferable that a negative type photosensitive resin composition coating film be formed on a support body using the negative type photosensitive resin composition and it is more preferable that a negative type photosensitive resin composition film be formed using a sheet-like support body. As a form other than the negative type photosensitive resin composition film, a supportless structure may also be adopted. A negative type photosensitive resin composition film can be produced, for example, by spreading the negative photosensitive resin composition on a support body and then drying it.

[0078]

In regard to the negative type photosensitive resin composition film, it is preferable that the negative type photosensitive resin composition coating film has a melt viscosity of $0.5 \times 10^6$ Pa·s or more and $1.0 \times 10^7$ Pa·s or less at 40°C. If the negative type photosensitive resin composition coating film has a melt viscosity of $0.5 \times 10^6$ Pa·s or more at 40°C, the tackiness of the surface of the negative type photosensitive resin composition film at room temperature will be reduced, making the handling of the negative type photosensitive resin composition film easier. If the negative type photosensitive resin composition coating film has a melt viscosity of $1.0 \times 10^7$ Pa·s or less at 40°C, it is preferable because cracking of the negative type photosensitive resin composition film at room temperature will be suppressed, allowing the negative type photosensitive resin composition film to suffer less defects and achieve a higher yield. The melt viscosity at 40°C of the negative type photosensitive resin composition coating film can be measured by the procedure described below. First, two layers of the negative type photosensitive resin composition coating films are disposed so that they face each other and they are thermocompression-bonded at 60°C to prepare a layered stack of the photosensitive resin composition coating films. The above operation is carried out repeatedly until the stack of the photosensitive resin composition coating films reaches a thickness of 600 to 700 μm. Then, the stack of the negative type photosensitive resin composition coating films is subjected to measurement by a rheometer under the conditions of a frequency of 0.2 Hz, a strain quantity of 1.0%, and heating from 30°C to 80°C at a rate of 2°C/min and the complex melt viscosity at 40°C is read, thereby determining the melt viscosity at 40°C of the negative type photosensitive resin composition coating film.

[0079]

In regard to the cured product according to the present invention, the negative type photosensitive resin composition or the negative type photosensitive resin composition coating film is cured to provide a cured product.

[0080]

The cured product may be in any appropriate form as long as it is prepared by curing the negative type photosensitive resin composition or the negative type photosensitive resin

composition coating film by means of light or heat. The curing by means of light or heat can

CLAIMS

[Claim 1]

A negative type photosensitive resin composition comprising a polymer compound (A), a cationic polymerizable compound (B), and a cationic polymerization initiator (C) wherein:

the component (A) contains at least one compound selected from the group consisting of polyamide, polyimide, polybenzoxazole, precursors thereof, and copolymers thereof, wherein the polyamide is a polyamide that is not a polyimide precursor or a polybenzoxazole precursor;

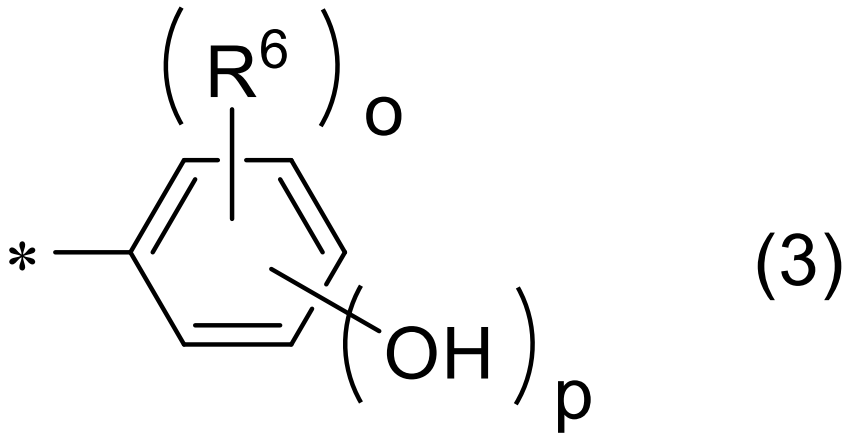
the component (C) is designed to generate an acid when receiving light or heat and promote cationic polymerization and contains a sulfonium salt, the sulfonium salt containing the gallate ion as a counter anion; and

both the relations $0.6A \leq B + 0.5C \leq 0.98A$ and $0.05(B + C) \leq C \leq 0.25(B + C)$ are satisfied where A, B and C represent the numbers of moles of all carboxylic acid residues, all diamine residues, and all monoamine residues, respectively, contained in the component (A).

[Claim 2]

A negative type photosensitive resin composition as set forth in claim 1 wherein the monoamine residues have structures as represented by the formula (3):

[Chemical compound 1]



(3)

wherein in the formula (3), $R^6$ is a monovalent organic group having 1 to 6 carbon atoms; o denotes 0 or 1; p denotes 0 or 1; and * denotes a bonding point.

[Claim 3]

A negative type photosensitive resin composition as set forth in either claim 1 or 2 wherein the light transmittance at a wavelength of 365 nm per μm film thickness of the component (A) is 90% or more.

[Claim 4]

A negative type photosensitive resin composition as set forth in any one of claims 1 to 3 wherein the component (B) contains a polyfunctional epoxy compound (B-1) with an epoxy equivalent weight of 80 g/eq or more and less than 160 g/eq and wherein the component (B-

1) has an octanol-water distribution coefficient (log P value) of -2 or more and less than 5.

[Claim 5]

A negative type photosensitive resin composition as set forth in any one of claims 1 to 4 wherein the component (B) accounts for 100 parts by mass or more and 150 parts by mass or less relative to 100 parts by mass of the component (A).

[Claim 6]

A negative type photosensitive resin composition as set forth in any one of claims 1 to 5 wherein the component (B) contains a polyfunctional epoxy compound (B-1) with an epoxy equivalent weight of 80 g/eq or more and less than 160 g/eq and a polyfunctional epoxy compound (B-2) with an epoxy equivalent weight of 160 g/eq or more and less than 500 g/eq and wherein the component (B-1) accounts for 40 to 99 mass% and the component (B-2) accounts for 1 to 60 mass% in the component (B).

[Claim 7]

A negative type photosensitive resin composition as set forth in any one of claims 1 to 6 wherein the content of $F^-$, $Cl^-$, $Br^-$, and $I^-$ is less than 100 ppm by mass.

[Claim 8]

A negative type photosensitive resin composition film comprising a support body and a negative type photosensitive resin composition coating film formed thereon from a negative type photosensitive resin composition as set forth in any one of claims 1 to 7 wherein the negative type photosensitive resin composition coating film has a melt viscosity at 40°C of $0.5 \times 10^6$ Pa·s or more and $1.0 \times 10^7$ Pa·s or less.

[Claim 9]

A cured product produced by curing a negative type photosensitive resin composition as set forth in any one of claims 1 to 7 or by curing a negative type photosensitive resin composition coating film as set forth in claim 8.

[Claim 10]

A cured product as set forth in claim 9 wherein the negative type photosensitive resin composition coating film satisfies the relation $T_2 / T_1 \geq 0.98$ where $T_1$ is the coating film thickness and $T_2$ is the coating film thickness after curing at 200°C for 1 hour.

[Claim 11]

A production method for a cured product comprising a step for spreading a negative type photosensitive resin composition as set forth in any one of claims 1 to 7 over a substrate followed by drying it to form a negative type photosensitive resin composition coating film on the substrate, a step for applying light to the photosensitive resin composition coating film, a step for developing the negative type photosensitive resin composition coating film to remove the unexposed portions using an alkaline aqueous solution, and a step for heat-treating the developed photosensitive resin film to form a cured product.

[Claim 12]

A hollow structure comprising a support material containing a cured product as set forth in claim 9.

[Claim 13]

An electronic component comprising a cured product as set forth in claim 9.