DESCRIPTION

METHOD FOR MANUFACTURING COMPOSITE BODY AND COMPOSITION

Technical Field

[0001] The present invention relates to a method for manufacturing a composite body, and a composition.

Background Art

[0002] Conventionally, in various technical fields such as the field of electronic devices, application of a composition containing a polymer to a member has been conducted.

For example, a technique of applying a semiconductor composition that contains a polymer having two or more cationic functional groups and having a weight average molecular weight of from 2,000 to 100,000, to an interlayer insulating layer of a semiconductor device is known (see, for example, International Publication (WO) 2010/137711).

SUMMARY OF DISCLOSURE

Technical Problem

[0003] Incidentally, when applying a polymer to each of the members of a composite member including two or more kinds of members, there are cases in which the polymer is required to remain preferentially (preferably, selectively) on a specific member. An example of such a composite member is a composite member including an insulating layer as a member and a conductive part (for example, a wiring, an electrode, or the like) as other member. In the case of applying a polymer to the composite member according to this example, it is required that the polymer remains on the insulating layer as much as possible, to protect the insulating layer and, at the same time, the polymer does not remain on the conductive part as much as possible, to maintain the electrical connectivity in the surface of the conductive part. Accordingly, when applying a polymer to the composite member, it is required to achieve both the ease of remaining the polymer on the insulating layer and the difficulty of remaining the polymer on the conductive part.

[0004] The disclosure has been made in view of the above circumstances.

In one aspect, there is provided a method for manufacturing a composite body, the method comprising: a composition preparation process of preparing a composition that contains a polymer having a cationic functional group and having a weight average molecular

weight of from 2,000 to 1,000,000; and a monocarboxylic acid compound, and that has a pH of from 2.0 to 11.0; a composite member preparation process of preparing a composite member that includes a member A and a member B, a surface of the member B having an isoelectric point that is lower than an isoelectric point of a surface of the member A by 2.0 or more and the isoelectric point of the member B being from 1.0 to 7.5, and that satisfies a relationship: the isoelectric point of a surface of the member B < the pH of the composition < the isoelectric point of a surface of the member A; and an application process of applying the composition to the surface of the member A and the surface of the member B included in the composite member.

Namely, an embodiment of the disclosure is to provide a method for manufacturing a composite body that can achieve both the ease of remaining the polymer on a specific member and the difficulty of remaining the polymer on other member, in the manufacture of a composite body by applying a polymer to the surface of a composite member including two or

more kinds of members, the composite body being equipped with the composite member and the polymer.

In another aspect, there is provided a composition that comprises a polymer having a cationic functional group and having a weight average molecular weight of from 2,000 to 1,000,000 and a branching degree of 48% or more; and a monocarboxylic acid compound, and that has a pH of from 2.0 to 11.0, wherein a content of sodium and a content of potassium in the composition are each 10 ppb by mass or less, on an elemental basis.

Further, another embodiment of the disclosure is to provide a composition containing a polymer, in which the composition can achieve both the ease of remaining the polymer on a specific member and the difficulty of remaining the polymer on other member, when applied to two or more kinds of composite members.

Solution to Problem

[0005] Specific means for addressing the above problems are as follows.

<1> A method for manufacturing a composite body, the method containing:

a composition preparation process of preparing a composition that contains a polymer having a cationic functional group and having a weight average molecular weight of from 2,000 to 1,000,000, and that has a pH of from 2.0 to 11.0;

a composite member preparation process of preparing a composite member that includes a member A and a member B, a surface of the member B having an isoelectric point that is lower than an isoelectric point of a surface of the member A by 2.0 or more and the isoelectric point of the member B being from 1.0 to 7.5, and that satisfies a relationship: the isoelectric point of a surface of the member B < the pH of the composition < the isoelectric point of a surface of the member A; and

an application process of applying the composition to the surface of the member A and the surface of the member B included in the composite member.

<2> The method for manufacturing a composite body according to <1>, wherein the member A contains at least one element selected from the group consisting of Cu, Al, Ti, Fe, Sn, Cr, Mn, Ni, Pt, Zn and Mg, and the member B contains silica.

<3> The method for manufacturing a composite body according to <1> or <2>, wherein the member A contains Cu, and the member B contains silica.

<4> The method for manufacturing a composite body according to any one of <1> to <3>, wherein a content of sodium and a content of potassium in the composition are each 10 ppb by mass or less, on an elemental basis.

<5> The method for manufacturing a composite body according to any one of <1> to <4>, the method further comprising a heating process of heating the composite member to

which the composition has been applied, under a condition of a temperature of from 70°C to 125°C.

<6> The method for manufacturing a composite body according to any one of <1> to <5>, wherein the member B contains a porous material.

<7> The method for manufacturing a composite body according to any one of <1> to

compound.

<19> The composition according to <17> or <18>, being a semiconductor sealing composition.

Advantageous Effects

[0007] According to the disclosure, a method for manufacturing a composite body that can achieve both the ease of remaining the polymer on a specific member and the difficulty of remaining the polymer on other member, in the manufacture of a composite body by applying a polymer to the surface of a composite member including two or more kinds of members, the composite body being equipped with the composite member and the polymer, may be provided.

Further, according to the disclosure, a composition containing a polymer, in which the composition can achieve both the ease of remaining the polymer on a specific member and the difficulty of remaining the polymer on other member, when applied to two or more kinds of composite members, may be provided.

BRIEF DESCRIPTION OF DRAWINGS

[0008] Fig. 1 is a conceptual sectional diagram schematically showing a cross section of a composite member, in one example of the manufacturing method according to the invention.

Fig. 2 is a conceptual sectional diagram schematically showing a cross section of a composite member, in another example of the manufacturing method according to the invention.

Fig. 3 is a graph showing the relationship between the soft bake temperature and, the thickness of the polymer layer on Si and the thickness of the polymer layer on Cu, in Examples.

Fig. 4 is a graph showing the relationship between the pH of the composition and, the thickness of the polymer layer on Si and the thickness of the polymer layer on Cu, in Examples and Comparative Examples.

DESCRIPTION OF EMBODIMENTS

[0009] Hereinafter, the method for manufacturing a composite body of the invention is described, and in this description, the composition of the invention is also described.

[0010] <<Method for Manufacturing Composite Body>>

The method for manufacturing a composite body of the invention (hereinafter, also referred to as the "manufacturing method of the invention") has a composition preparation process of preparing a composition that contains a polymer having a cationic functional group

CLAIMS

1. A method for manufacturing a composite body, the method comprising:

a composition preparation process of preparing a composition that contains a polymer having a cationic functional group and having a weight average molecular weight of from 2,000 to 1,000,000; and a monocarboxylic acid compound, and that has a pH of from 2.0 to 11.0;

a composite member preparation process of preparing a composite member that includes a member A and a member B, a surface of the member B having an isoelectric point that is lower than an isoelectric point of a surface of the member A by 2.0 or more and the isoelectric point of the member B being from 1.0 to 7.5, and that satisfies a relationship: the isoelectric point of a surface of the member B < the pH of the composition < the isoelectric point of a surface of the member A; and

an application process of applying the composition to the surface of the member A and the surface of the member B included in the composite member.

2. The method for manufacturing a composite body according to claim 1, wherein the member A contains at least one element selected from the group consisting of Cu, Al, Ti, Fe, Sn, Cr, Mn, Ni, Pt, Zn and Mg, and the member B contains silica.

3. The method for manufacturing a composite body according to claim 1 or claim 2, wherein the member A contains Cu, and the member B contains silica.

4. The method for manufacturing a composite body according to any one of claims 1 to 3, wherein a content of sodium and a content of potassium in the composition are each 10 ppb by mass or less, on an elemental basis.

5. The method for manufacturing a composite body according to any one of claims 1 to 4, the method further comprising a heating process of heating the composite member to which the composition has been applied, under a condition of a temperature of from 70°C to 125°C.

6. The method for manufacturing a composite body according to any one of claims 1 to 5, wherein the member B contains a porous material.

7. The method for manufacturing a composite body according to any one of claims 1 to 6, wherein the polymer has a cationic functional group equivalent weight of from 27 to 430.

8. The method for manufacturing a composite body according to any one of claims 1 to 7, wherein the polymer is a polyethyleneimine or a derivative of a polyethyleneimine.

9. The method for manufacturing a composite body according to any one of claims 1 to 8, wherein the polymer has a branching degree of 48% or more.

10. The method for manufacturing a composite body according to any one of claims 1 to 9, wherein the monocarboxylic acid compound does not have a hydroxyl group or an amino group, and has a van der Waals volume of 40 cm^3/mol or more.

11. The method for manufacturing a composite body according to any one of claims 1 to 10, wherein the composite member satisfies a relationship: the isoelectric point of a surface of the member B < the pH of the composition < {(the isoelectric point of a surface of the member A) - 1.0}.

12. The method for manufacturing a composite body according to any one of claims 1 to 11, the method further comprising a cleaning process of cleaning the composite member to which the composition has been applied, with a rinsing liquid at a temperature of from 15°C to 100°C.

13. The method for manufacturing a composite body according to claim 12, wherein the rinsing liquid comprises an acid having, in one molecule, at least one of a moiety that blocks active species or a functional group that forms a bond with the polymer when heated.

14. The method for manufacturing a composite body according to any one of claims 1 to 13, the method further comprising a high temperature heating process of heating the composite member to which the composition has been applied, under a condition of a temperature of from 200°C to 425°C.

15. The method for manufacturing a composite body according to any one of claims 1 to 14,

wherein the composite member comprises a substrate and, on the substrate, a conductive part as the member A and an insulating layer as the member B.

16. A composition that comprises a polymer having a cationic functional group and having a weight average molecular weight of from 2,000 to 1,000,000 and a branching degree of 48% or more; and a monocarboxylic acid compound, and that has a pH of from 2.0 to 11.0, wherein a content of sodium and a content of potassium in the composition are each 10 ppb by mass or less, on an elemental basis.

17. The composition according to claim 16, being a semiconductor sealing composition.