caused by the thermal expansion. Here, according to the recent tendency of using a resin composition having a high content of inorganic fillers, the thermal expansion of the obtained insulating layer is generally low, but the elastic modulus is extremely high. Therefore, the warpage problem is not alleviated at all, and it is desired to take measures. It is also considered that a flexible component can be added to the resin composition in order to reduce the elastic modulus of the insulating layer. However, in such a case, the thermal expansion of the insulating layer increases. Therefore, it is inferred that the warpage problem cannot be alleviated, either.

SUMMARY OF THE INVENTION

Embodiments of the present invention provide a resin composition that does not cause the warpage problem even when the thin core substrate is used.

The present inventors have found that the above-described problem can be solved by using a specific resin composition described below, and thus completed the present invention.

That is, embodiments of the present invention include the following contents.

According to a first aspect of the present invention, there is provided a resin composition including:

(A) an epoxy resin that is solid at 25°C;

(B) an inorganic filler; and

(C) at least one resin selected from the group consisting of a functional group-containing saturated butadiene resin that is liquid at 25°C, a functional group-containing unsaturated butadiene resin that is liquid at 25°C, and a functional group-containing acrylic resin having a glass transition temperature of 25°C or lower, wherein

when a content of a non-volatile component in the resin composition is assumed to be 100% by mass, a content of the (B) component is 40% by mass or more,

when a content of a resin component is assumed to be 100% by mass, a content of the (C) component is 10 to 40% by mass, and

a linear thermal expansion coefficient (α:ppm/°C) of a cured body obtained by curing the resin composition is 25 ppm or less.

In an embodiment of the above resin composition, the (C) component has at least one functional group selected from the group consisting of an acid anhydride group, a phenolic hydroxy group, an epoxy group, an isocyanate group, and a urethane group.

In an embodiment of the above resin composition, the (A) component is a multifunctional naphthalene skeleton epoxy resin.

In an embodiment, the above resin composition further comprises a curing agent.

In an embodiment of the above resin composition, the resin composition is a resin composition for embedding parts for the circuit board with built-in parts.

In an embodiment of the above resin composition, the inorganic filler has an average particle diameter of 10 μm or less, and is classified to remove a particle of 20 μm or more.

According to a second aspect of the present invention, there is provided a cured body obtained by curing the above resin composition.

In an embodiment, the above cured body has a glass transition temperature of 170°C or higher.

In an embodiment of the above cured body, a product $\alpha \times E$ of a linear thermal expansion coefficient (α:ppm/°C) and an elastic modulus (E:GPa) is 150 or less.

According to a third aspect of the present invention, there is provided a circuit board with built-in parts prepared using the above cured body.

According to embodiments of the present invention, there can be provided a resin composition that does not cause the warpage problem even when the thin core substrate is used.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will be described in detail below in conformity with preferred embodiments thereof.

[Resin Composition]

The resin composition according to the present invention includes (A) an epoxy resin that is solid at 25°C, (B) an inorganic filler, and (C) at least one resin selected from the group consisting of a functional group-containing saturated butadiene resin that is liquid at 25°C, a functional group-containing unsaturated butadiene resin that is liquid at 25°C, and a functional group-containing acrylic resin having a glass transition temperature of 25°C or lower, wherein when the content of a non-volatile component in the resin composition is assumed to be 100% by mass, the content of the (B) component is 40% by mass or more, and when the content of a resin component is assumed to be 100% by mass, the content of the (C) component is 10 to 40% by mass.

The present inventors have found that the warpage problem can be solved by using the resin composition

CLAIMS

1. A resin composition comprising:

(A) an epoxy resin that is solid at 25°C;

(B) an inorganic filler; and

(C) at least one resin selected from the group consisting of a functional group-containing saturated butadiene resin that is liquid at 25°C, a functional group-containing unsaturated butadiene resin that is liquid at 25°C, and a functional group-containing acrylic resin having a glass transition temperature of 25°C or lower, wherein

when a content of a non-volatile component in the resin composition is assumed to be 100% by mass, a content of the (B) component is 40% by mass or more,

when a content of a resin component is assumed to be 100% by mass, a content of the (C) component is 10 to 40% by mass, and

a linear thermal expansion coefficient (α:ppm/°C) of a cured body obtained by curing the resin composition is 25 ppm or less.

2. The resin composition according to claim 1, wherein the (C) component has at least one functional group selected from the group consisting of an acid anhydride group, a phenolic hydroxy group, an epoxy group, an isocyanate group, and a urethane group.

3. The resin composition according to claim 1 or 2, wherein the (A) component is a multifunctional naphthalene skeleton epoxy resin.

4. The resin composition according to any one of claims 1 to 3, further comprising a curing agent.

5. The resin composition according to any one of claims 1 to 4, wherein the resin composition is a resin composition for embedding parts for the circuit board with built-in parts.

6. The resin composition according to any one of claims 1 to 5, wherein the inorganic filler has an average particle diameter of 10 μm or less, and is classified to remove a particle of 20 μm or more.

7. A cured body obtained by curing the resin composition according to any one of claim 1 to 6.

8. The cured body according to claim 7, having a glass transition temperature of 170°C or higher.

9. The cured body according to claim 7 or 8, wherein a product $\alpha \times E$ of a linear thermal expansion coefficient (α:ppm/°C) and an elastic modulus (E:GPa) is 150 or less.

10. A circuit board with built-in parts prepared using the cured body according to any one of claims 7 to 9.