PRIOR-ART DOCUMENTS

PATENT DOCUMENTS

[0004] Patent document 1: Japanese Patent Application Publication No. 2011-95731

Patent document 2: Japanese Patent Application Publication No. 2011-29232

Patent document 3: Japanese Patent Application Publication No. 2011-202177

Patent document 4: Japanese Patent Application Publication No. 2010-116453

Patent document 5: Japanese Patent Application Publication No. 2009-194054

SUMMARY ~~OF THE INVENTION~~

PROBLEM TO BE SOLVED ~~BY THE INVENTION~~

[0005] Since the resin composition in which a large amount of inorganic particles is mixed is high in melt viscosity, there has been a problem that when an electronic component part and a substrate are adhered via a resin composition and electrodes thereof are electrically connected to each other, burial of the electrodes in the resin composition becomes insufficient, so that the reliability of the electrical connection of the joined portions deteriorates. Furthermore, there has been a problem that during preservation of a paste-state resin composition, inorganic particles gradually aggregates together or the hardening of the resin progresses and the viscosity increases. Due to this, for example, in the case where the paste-state resin composition is formed into a sheet state, the flatness deteriorates so that adhesion of an electronic component part, a substrate, etc. cannot be favorably carried out.

[0006] As for the present ~~invention~~disclosure, it is an object of the embodiments disclosed herein to provide a resin composition containing inorganic particles which is low in melt viscosity and excellent in preservation stability, and a hardened material of which is good in endurance with respect to a thermal cycle test or the like, and which can provide a semiconductor device that is high in connection reliability.

MEANS FOR SOLVING THE PROBLEM

[0007] The present disclosure~~invention~~ is a resin composition which contains (a) an epoxy compound, (b) a microcapsule type hardening acceleration agent, and (c) an inorganic particle whose surface is modified with a compound that has an unsaturated double bond.

[0007a] In an aspect, there is provided a resin composition containing (a) an epoxy compound, (b) a microcapsule type hardening acceleration agent, (c) an inorganic particle whose surface is modified with a compound that has an unsaturated double bond, and (d) a compound that has (d1) a group selected from an acryloxy group and a methacryloxy group and (d2) a group selected from a carboxyl group and a hydroxyl group.

[0008] Furthermore, in another aspect ~~of the present invention is~~, there is provided a resin composition sheet comprising the resin composition mentioned above.

[0009] Furthermore, in another aspect ~~of the present invention is~~, there is provided a semiconductor device in which two circuit members are electrically connected via the resin composition or the resin composition sheet mentioned above.

[0010] Furthermore, in another aspect ~~of the present invention is~~, there is provided a production method for a semiconductor device in which the resin composition or the resin composition sheet mentioned above is interposed between a first circuit member and a second circuit member, and the first circuit member and the second circuit member are electrically connected by heating and pressurizing.

EFFECTS ~~OF THE INVENTION~~

[0011] The resin composition of the present ~~invention~~ disclosure is low in melt viscosity and good in preservation stability. Furthermore, a hardened material of the resin composition is good in endurance with respect to a thermal cycle test or the like, and therefore a circuit board or a semiconductor device that is high in connection

reliability can be provided.

FORMS FOR CARRYING OUT THE INVENTION

[0012] The resin composition of the present invention contains (a) an epoxy compound. The (a) epoxy compound hardens due to ring opening that is generally not accompanied by shrinkage, so that it becomes possible to reduce the shrinkage at the time of the hardening of the resin composition. The (a) epoxy compound is preferred to be

CLAIMS

1. A resin composition containing (a) an epoxy compound, (b) a microcapsule type hardening acceleration agent, ~~and~~ (c) an inorganic particle whose surface is modified with a compound that has an unsaturated double bond, and (d) a compound that has (d1) a group selected from an acryloxy group and a methacryloxy group and (d2) a group selected from a carboxyl group and a hydroxyl group.

2. The resin composition according to claim 1, wherein the (c) inorganic particle whose surface is modified with the compound that has the unsaturated double bond is (c) an inorganic particle whose surface is modified with a compound that has a group selected from an acryloxy group and a methacryloxy group.

3. The resin composition according to claim 1 or 2, wherein the (a) epoxy compound is an epoxy compound having a dicyclopentadiene skeleton.

~~4. The resin composition according to any one of claims 1 to 3, further containing (d) a compound that has (d1) a group selected from an acryloxy group and a methacryloxy group and (d2) a group selected from a carboxyl group and a hydroxyl group.~~

~~5~~4. The resin composition according to any one of claims 1 to 43, further containing (e) an organic solvent-soluble polyimide.

~~6~~5. The resin composition according to any one of claims 1 to ~~5~~4, wherein the (c) inorganic particle is a silica particle.

~~7~~6. The resin composition according to any one of claims 1 to ~~6~~5, wherein a dispersed particle diameter of the (c) inorganic particle is 1 to 300 nm.

~~8~~7. A resin composition sheet comprising the resin composition according to any one of claims 1 to ~~7~~6.

~~9~~8. A semiconductor device in which two circuit members are electrically connected via the resin composition according to any one of claims 1 to ~~7~~6 or the resin composition sheet according to claim ~~8~~7.

~~10~~9. A production method for a semiconductor device, in which method the resin

composition according to any one of claims 1 to ~~7~~ 6 or the resin composition sheet according to claim ~~8~~ 7 is interposed between a first circuit member and a second circuit member, and the first circuit member and the second circuit member are electrically connected by heating and pressurizing.