CLAIMS

[Claim 1] A bonding composition comprising copper powder, a liquid medium, and a reducing agent, wherein:

the reducing agent contains at least one ~~amino~~ selected from the group consisting of bis(2-hydroxyethyl)iminotris(hydroxymethyl)methane, 2-amino-2-(hydroxymethyl)-1,3-propanediol, and ~~a plurality of hydroxyl groups;~~ 1,3-bis(tris(hydroxymethyl)methylamino)propane;

the ~~reducing agent has~~liquid medium comprises a polyol having a boiling point ~~that~~below 300°C;

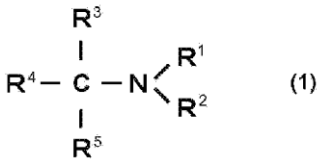
the liquid medium is ~~higher than a boiling point~~capable of ~~the liquid medium; and~~ dissolving the reducing agent at 25°C;

the reducing agent has a melting point that is equal to or below the sintering temperature of the copper powder~~.~~; and

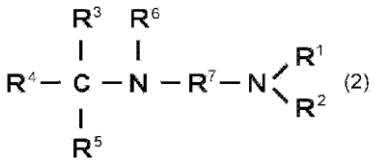
the bonding composition contains from 0.1 parts to 10 parts by mass of the reducing agent with respect to 100 parts by mass of the copper powder.

[Claim 2] The bonding composition according to claim 1~~, wherein the reducing agent is represented by formula (1) or (2) below:~~

~~[Chem. 1]~~



(1)



(2)

~~wherein:~~

~~R^1 to R^6 each independently represent a hydrogen atom, a hydroxyl group, a hydrocarbon group having 1 to 10 carbon atoms, or a hydrocarbon~~

~~group having 1 to 10 carbon atoms and containing a hydroxyl group;~~

~~R^7 represents a hydrocarbon group having 1 to 10 carbon atoms or a hydrocarbon group having 1 to 10 carbon atoms and containing a hydroxyl group;~~

~~in formula (1), at least two of R^1 to R^5 contain a hydroxyl group; and~~

~~in formula (2), at least two of R^1 to R^6 contain a hydroxyl group.~~

~~[Claim 3] The bonding composition according to claim 2, wherein the reducing agent is bis(2-hydroxyethyl)iminotris(hydroxymethyl)methane.~~

~~[Claim 4] The bonding composition according to any one of claims 1 to 3~~, wherein the bonding composition has a viscosity of from 10 Pa·s to 200 Pa·s at a shear rate of 10 s^{-1} at 25°C.

[Claim ~~5~~] 3] The bonding composition according to ~~any one of claims~~claim 1 ~~to 4~~or 2, comprising the ~~copper powder, from 0.1 parts to 10 parts by mass of reducing agent with respect to 100 parts by mass of the copper powder, and~~bonding composition contains from 10 parts to 40 parts by mass of the liquid medium with respect to 100 parts by mass of the copper powder.

[Claim ~~6~~] 4] A method for producing a conductor bonding structure, the method comprising:

applying the bonding composition according to any one of claims 1 to ~~5~~3 onto a surface of a first conductor to form a coating film;

drying the coating film to remove at least a portion of the liquid medium and thereby obtain a dried coating film;

applying a second conductor onto the dried coating film to interpose the dried coating film between the first conductor and the second conductor; and

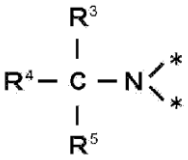
heating the dried coating film, to sinter the copper powder contained in the dried coating film and thereby bond the first conductor and the second conductor.

[Claim ~~7~~5] A conductor bonding structure in which two conductors are electrically connected by a joint portion, wherein:

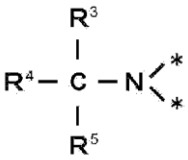
the joint portion comprises ~~–~~a ~~material constituted mainly by~~sintered body of copper particles; and

a moiety ~~–~~(3) shown below is formed in the joint portion:

~~[Chem. 2]~~



(3)



(3)

wherein:

R^3 to R^5 ~~each independently~~ represent a ~~hydrogen atom, a hydroxyl group, a~~ hydrocarbon group having 1 ~~to 10~~ carbon ~~atoms, or a hydrocarbon group having 1 to 10 carbon atoms~~atom and containing a hydroxyl group; and

* represents a bonding hand ~~–~~with copper.

~~.~~[Claim 6] A method for producing a conductor bonding structure, the method comprising:

applying a bonding composition onto a surface of a first conductor to form a coating film, the bonding composition comprising copper powder, a liquid medium, and a reducing agent;

drying the coating film to obtain a dried coating film;

applying a second conductor onto the dried coating film to interpose the dried coating film between the first conductor and the second conductor; and

sintering the copper powder contained in the dried coating film under pressure, thereby to bond the first conductor and the second conductor, wherein

the reducing agent has a boiling point that is higher than a boiling point of the liquid medium,

the reducing agent has a melting point that is equal to or below the sintering temperature of the copper powder,

the liquid medium comprises alcohol having a boiling point of 188°C or higher and lower than 300°C,

a proportion of the liquid medium is from 10 parts to 40 parts by mass with respect to 100 parts by mass of the copper powder, and

the reducing agent contains at least one amino group and a plurality of hydroxyl groups.

[Claim 7] The method according to claim 6, wherein the coating film is dried such that a content of the liquid medium has been reduced to 9 mass% or less with respect to the total mass of the coating film.

[Claim 8] The method according to claim 6 or 7, using the bonding composition having a viscosity of from 10 Pa·s to 200 Pa·s at a shear rate of 10 s^{-1} at 25°C.

[Claim 9] The method according to any one of claims 6 to 8, using the bonding composition containing from 0.1 parts to 10 parts by mass of the reducing agent with respect to 100 parts by mass of the copper powder.

[Claim 10] A method for bonding conductors, the method comprising:

applying a bonding composition onto a surface of a first conductor to form a coating film, the bonding composition comprising copper powder, a liquid medium, and a reducing agent;

drying the coating film to obtain a dried coating film;

applying a second conductor onto the dried coating film to interpose the dried coating film between the first conductor and the second conductor; and

sintering the copper powder contained in the dried coating film under pressure, thereby to bond the first conductor and the second conductor, wherein

the reducing agent has a boiling point that is higher than a boiling point of the liquid medium,

the reducing agent has a melting point that is equal to or below the sintering temperature of the copper powder,

the liquid medium comprises alcohol having a boiling point of 188°C or higher and lower than 300°C,

a proportion of the liquid medium is from 10 parts to 40 parts by mass with respect to 100 parts by mass of the copper powder, and

the reducing agent contains at least one amino group and a plurality of hydroxyl groups.

[Claim 11] The method according to claim 10, wherein the coating film is dried such that a content of the liquid medium has been reduced to 9 mass% or less with

respect to the total mass of the coating film.

[Claim 12] The method according to claim 10 or 11, using the bonding composition having a viscosity of from 10 Pa·s to 200 Pa·s at a shear rate of 10 s^{-1} at 25°C.

[Claim 13] The method according to any one of claims 10 to 12, using the bonding composition containing from 0.1 parts to 10 parts by mass of the reducing agent with respect to 100 parts by mass of the copper powder.

[Claim 14] A bonding composition for bonding a first conductor and a second conductor under pressure,

the bonding composition comprising copper powder, a liquid medium, and a reducing agent, wherein

the reducing agent has a boiling point that is higher than a boiling point of the liquid medium,

the reducing agent has a melting point that is equal to or below the sintering temperature of the copper powder,

the liquid medium comprises alcohol having a boiling point of 188°C or higher and lower than 300°C,

a proportion of the liquid medium is from 10 parts to 40 parts by mass with respect to 100 parts by mass of the copper powder, and

the reducing agent contains at least one amino group and a plurality of hydroxyl groups.

[Claim 15] The bonding composition according to claim 14, wherein the bonding composition has a viscosity of from 10 Pa·s to 200 Pa·s at a shear rate of 10 s^{-1} at 25°C.

[Claim 16] The bonding composition according to claim 14 or 15, wherein the bonding composition contains from 0.1 parts to 10 parts by mass of the reducing agent with respect to 100 parts by mass of the copper powder.