CLAIMS

[Claim 1] A method for producing a bonded structure in which a first bonding target material and a second bonding target material are bonded with a bonding layer interposed between the first bonding target material and the second bonding target material,

the method comprising:

a step of applying a bonding composition to the first bonding target material to form a wet coating film, the bonding composition containing copper powder and an organic substance that is liquid at 25°C;

a step of removing the organic substance from the wet coating film to obtain a dry coating film;

a step of temporarily fixing the second bonding target material to the dry coating film by applying pressure, to obtain a laminate in which the first bonding target material, the dry coating film, and the second bonding target material are layered in this order; and

a step of heating the laminate under pressure to sinter the copper powder in the dry coating film, and bonding the first bonding target material and the second bonding target material by the bonding layer formed by sintering,

wherein the organic substance contains a first organic substance, and

the first organic substance has a boiling point of 230°C or higher and lower than 300°C, and a viscosity of 100 mPa·s or higher and 1000 mPa·s or less at 25°C and at a shear rate of 10 s^{-1}.

[Claim 2] The method for producing a bonded structure according to claim 1, wherein

any two among temperature, pressure, and time when the copper powder is sintered are higher or longer than any two among temperature, pressure, and time when the second bonding target material is temporarily fixed to the dry coating film.

[Claim 3] The method for producing a bonded structure according to claim 1 or 2, wherein

the organic substance is removed from the wet coating film to obtain the dry coating film having no fluidity.

[Claim 4] The method for producing a bonded structure according to claim 3, wherein

the organic substance is removed from the wet coating film so that a mass of the wet coating film is reduced by from 15 to 30 mass%.

[Claim 5] The method for producing a bonded structure according to claim 1 or 2, wherein

when a content of the organic substance in the wet coating film is 100 parts by mass, the organic substance is removed from the wet coating film so that a content of the organic substance in the dry coating film becomes 25 parts by mass or less.

[Claim 6] The method for producing a bonded structure according to claim 1 or 2, wherein

the wet coating film is heated in an air atmosphere or an inert gas atmosphere at a temperature of from 100°C to 200°C for 10 minutes or more, to remove the organic substance and obtain the dry coating film.

[Claim 7] The method for producing a bonded structure according to claim 1 or 2, wherein

the bonding composition contains at least one reducing substance.

[Claim 8] The method for producing a bonded structure according to claim 7, wherein

at least one of the substances is an amino alcohol compound.

[Claim 9] The method for producing a bonded structure according to claim 1 or 2, wherein

the bonding composition contains from 15 to 45 parts by mass of the first organic substance per 100 parts by mass of the copper powder.

[Claim 10] The method for producing a bonded structure according to claim 1 or 2, wherein

the second bonding target material is temporarily fixed to the dry coating film by applying pressure and heat.

[Claim 11] The method for producing a bonded structure according to claim 1 or 2, wherein

the first organic substance is a compound having a plurality of hydroxy groups.

[Claim 12] The method for producing a bonded structure according to claim 1 or 2, wherein

the laminate is obtained by temporarily fixing the second bonding target material to the dry coating film under a condition where the copper powder in the dry coating film does not sinter.

[Claim 13] The method for producing a bonded structure according to claim 1 or 2, wherein

the copper powder is sintered so that a bonding strength between the first bonding target material and the second bonding target material in the bonded structure is 30 MPa or more.

[Claim 14] A method for bonding a first bonding target material and a second bonding target material with a bonding layer interposed between the first bonding target material and the second bonding target material,

the method comprising:

a step of applying a bonding composition to the first bonding target material to form a wet coating film, the bonding composition containing copper powder and an organic substance that is liquid at 25°C;

a step of removing the organic substance from the wet coating film to obtain a dry coating film;

a step of temporarily fixing the second bonding target material to the dry coating film by applying pressure, to obtain a laminate in which the first bonding target material, the dry coating film, and the second bonding target material are layered in this order; and

a step of heating the laminate under pressure to sinter the copper powder in the dry coating film, and bonding the first bonding target material and the second bonding target material by the bonding layer formed by sintering,

wherein the organic substance contains a first organic substance, and

the first organic substance has a boiling point of 230°C or higher and lower than 300°C, and a viscosity of 100 mPa·s or higher and 1000 mPa·s or less at 25°C and at a shear rate of 10 s^{-1}.