[0006] However, in the above ACF and conventional conductive adhesives, the adhesive strength is often insufficient. For example, if curing of the thermosetting resin progress more quickly than the melting and bonding of the conductive filler in the adhesive composition, the bonding of the filler may be hindered.

[0007] The present disclosure was made in view of the above-described problems and specifically, provides a conductive adhesive that shows superior adhesiveness without containing harmful substances such as solder (lead).

[0008] That is, the present disclosure relates to a conductive adhesive composition, which comprises

(A) a thermosetting resin;

(C) a filler that contains a metal element; and

(D) at least one catalyst or curing agent,

wherein the reaction initiation temperature for the (A) thermosetting resin and the (D) at least one catalyst or curing agent is 180°C or higher.

Further, the reaction initiation temperature may preferably be 200°C or higher at times.

[0008a] In an aspect, there is provided a conductive adhesive composition, which comprises

(A) a thermosetting resin;

(C) a filler containing a metal element and having an average particle diameter of 5 μm or less; and

(D) at least one catalyst or curing agent,

wherein the reaction initiation temperature for the (A) thermosetting resin and the (D) at least one catalyst or curing agent is 180°C or higher, and the (A) thermo setting resin is a polyimide resin.

[0008b] In another aspect, there is provided a conductive adhesive composition, which comprises

(A) a thermosetting resin;

(C) a filler that containing a metal element and having an average particle diameter of 5 μm or less; and

(D) at least one catalyst or curing agent,

wherein the reaction initiation temperature for the (A) thermosetting resin and (D) at least one catalyst or curing agent is 200°C or higher, and the (A) thermosetting resin is a polyimide resin.

[0009] The conductive adhesive composition wherein the reaction initiation temperature between the aforementioned (A) and (D) is 180°C or higher shows superior adhesive strength, because, as described above, since the bonding of the filler may be hindered if the curing of the thermosetting resin progresses more quickly than the melting and bonding of the conductive filler in the adhesive composition, by setting the curing initiation temperature of the thermosetting resin at a higher temperature, the bonding of the filler proceeds more smoothly. When the reaction initiation temperature is 200°C or higher, the bonding of the filler is not hindered up to a higher temperature region, and the bonding between the fillers and the bonding between the filler and substrate are more likely to progress.

[0010] The present disclosure is especially effective in low-melting point solders.

[0011] Further, the (A) thermosetting resin is preferably an epoxy resin or a

polyimide resin. Among these, bismaleimide resin is especially preferable.

The (A) thermosetting resin preferably amounts to 0.5 to 20.0 percent by mass of the total mass of the solid content of the conductive adhesive composition.

[0012] Further, it is preferable that the conductive adhesive composition comprises (B) a flux.

The average particle size of the (B) flux is preferably 30 μm or smaller.

The (B) flux contains at least a carboxylic acid with a molecular weight of 300 or less.

[0013] Further, the (C) filler preferably contains a conductive particle C1, which contains at least one metal element R1, wherein R1 is at least one metal element selected from the group consisting of Cu, Ag, Au, Pt, Ir, Os, Pd, Ru, Ga, In, Al, Re, Zn, Ni, Sn, Bi and Sb.

The (C) filler is preferably a mixture that further contains a conductive particle C2, which contains a metal element R2.

The (C) filler preferably amounts to 75 percent by mass or more of the total mass of the solid content of the conductive adhesive composition.

The (C) filler is preferably one that is capable of forming a sintered compact.

[0014] Further, it is preferable that the melting point of a new alloy formed by the reaction between conductive particle C1 and conductive particle C2 is lower than the melting point of R1.

[0015] Further, it is preferable that the conductive adhesive composition further comprises a (E) polymer component.

The compounding ratio of the (E) polymer component is preferably 5 to 50 percent by mass of the solid content of the conductive adhesive composition, excluding the mass of the (C) filler.

[0016] In other aspects, there are provided an adhesive film, which comprises the above-described conductive adhesive composition coated on to a substrate, and further, an adhesive film with dicing tape, which comprises such adhesive film laminated on to a dicing tape.

Effect

[0017] The present disclosure is capable of providing a lead-free conductive adhesive composition that shows superior adhesive property.

BRIEF DESCRIPTION OF DRAWINGS

[0018] [FIG. 1] FIG. 1 shows an adhesive film with dicing tape that uses the adhesive of the present invention.

[FIG. 2] FIG. 2 is a sectional scheme of an embodiment of the adhesive film with dicing tape that differs from FIG. 1.

DESCRIPTION OF SOME EMBODIMENTS

[0019] ((A) Thermosetting Resin)

The thermosetting resin of the present invention refers to a modified or unmodified resin that has not been completely cured and/or crosslinked, and includes any precursor that is suitable for producing a thermosetting plastic and/or a thermosetting resin. For example, natural or synthetic monomers, oligomers, or polymers, which may undergo (radical) polymerization reaction, condensation polymerization, and/or polyaddition reaction to undergo further curing and/or crosslinking, are listed.

Note that in the present specification, the terms "cure" and "crosslink" refer to the reaction in which a crosslinked structure or a cured structure with a high molecular weight, as compared to its corresponding uncured resin, is generated by the reaction of the thermosetting resin and the catalyst and/or the curing agent.

[0020]

An arbitrary thermosetting resin is added as a means to improve the adhesiveness and high-temperature performance of the conductive adhesive composition. Further, it inactivates the flux.

[0021] As the thermosetting resin, for example, epoxy resin, phenol resin, novolac (phenol and/or cresol), polyurethane resin, polyimide resin, cyanate ester resin,

Claims

1. A conductive adhesive composition, which comprises

(A) a thermosetting resin;

(C) a filler containing a metal element and having an average particle diameter of 5 μm or less; and

(D) at least one catalyst or curing agent,

wherein the reaction initiation temperature for the (A) thermosetting resin and the (D) at least one catalyst or curing agent is 180°C or higher, and the (A) thermo setting resin is a polyimide resin.

2. A conductive adhesive composition, which comprises

(A) a thermosetting resin;

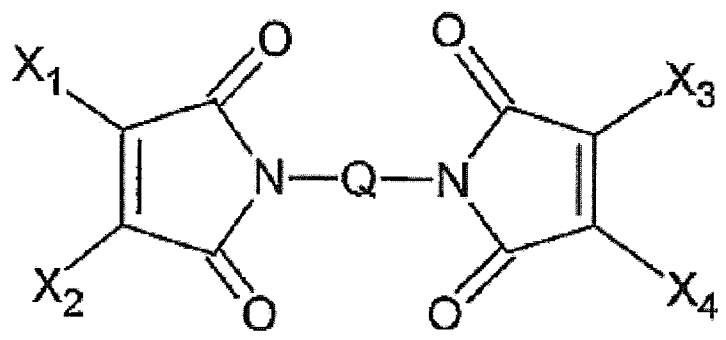
(C) a filler that containing a metal element and having an average particle diameter of 5 μm or less; and

(D) at least one catalyst or curing agent,

wherein the reaction initiation temperature for the (A) thermosetting resin and (D) at least one catalyst or curing agent is 200°C or higher, and the (A) thermosetting resin is a polyimide resin.

3. The conductive adhesive composition according to any one of Claims 1 or 2, which further comprises (B) a flux.

4. The conductive adhesive composition according to any one of Claims 1 to 3, wherein the (A) thermosetting resin is a bismaleimide resin expressed by the following structural formula



in the above formula, Q is a substituted or unsubstituted aliphatic, aromatic, heteroaromatic, siloxane part, or a combination thereof, with a structure in which an alicyclic hydrocarbon with 5 to 8 carbons is substituted by at least four alkyl groups with 4 to 12 carbons, X_1 to X_4 are each independently H or an alkyl group with 1 to 6 carbons.

5. The conductive adhesive composition according to any one of Claims 1 to 4, wherein the (A) thermosetting resin amounts to 0.5 to 20.0 percent by mass of the total mass of the solid content of the conductive adhesive composition.

6. The conductive adhesive composition according to any one of Claims 1 to 5, wherein the (C) filler contains a conductive particle C1, which contains at least one metal element R1, wherein R1 is at least one metal element selected from the group

of the solid content of the conductive adhesive composition, excluding the mass of the (C) filler.

15. An adhesive film, which comprises the conductive adhesive composition according to any one of Claims 1 to 14 coated on to a substrate.

16. An adhesive film with dicing tape, which comprises the adhesive film of Claim 15 laminated on to a dicing tape.