

at environments of, for example, 250°C or higher, and when combined with devices that use wide-gap semiconductors such as Si-C, it was difficult to make the most of the excellent heat resistance of the device. While enlarging the crosslinking density of the epoxy or acrylic resin improves heat resistance, the hardness of the cured resin becomes excessive, thereby leading to a lack of stress relaxation property and causing problems of chips and lead frames curving.

[0006] For such problems regarding the balance of heat resistance and stress relaxation, the use of silicone resin, which is flexible while showing excellent heat resistance, has been proposed.

[0007] However, when such silicone resins are used as binders, the diffusion of metals during sintering becomes poor. In particular, because sintering between metal particles is inhibited when combined with lead-free solders that form intermetallic compounds, there was a problem in that obtaining sufficient conductivity for use in, for example, rear-side electrodes of high voltage or high frequency power semiconductors was difficult.

RELATED ART

Patent Documents

[0008] Patent Document 1: JP-A-2004-160508
Patent Document 2: WO2011/083824
Patent Document 3: US2014/0120356 A1
Patent Document 4: JP-A-2013-221082
Patent Document 5: WO2010/103998

SUMMARY

[0009] The present ~~invention~~disclosure was made in order to solve the above-described problems, and provides an adhesive film that shows excellent heat resistance while showing excellent stress relaxation property, which further shows high conductivity that enables application to rear-side electrode for power semiconductors without the use of expensive precious metals such as silver, which also shows sufficient adhesive strength

without protruding from the device, and a method for processing semiconductors using the same.

[0009a] In a first aspect, there is provided a conductive adhesive film, which comprises two or more types of metal particles including at least Cu, and a polymer that has a polydimethylsiloxane structure.

[0010] That is, the present ~~disclosure~~^{invention} is related to a conductive adhesive film, which comprises two or more types of metal particles including at least Cu, and a polymer that has a polydimethylsiloxane structure, a dicing die bonding film, which comprises the conductive adhesive film and a dicing tape, and further, a method for processing semiconductor using the same.

Further, it is preferable that the metal particles contain a component with a melting point of 250°C or lower, and are capable of forming an intermetallic compound.

Further, in order to facilitate intermetallic compound reaction, it is preferable that the conductive adhesive tape contains at least one type of flux component selected from alcohol, ketone, carboxylic acid, or amine, wherein the flux component is in a state of phase separation with the polymer that has a polydimethylsiloxane structure.

Furthermore, it is preferable that at least part of the polymer that has a polydimethylsiloxane structure contains -COOH, -CR_x(OH)_y, or -NR₂ as a functional group (where R is selected from H, alkyl, or aryl group, and x+y=3), and further, contains a double bond.

Furthermore, it is preferable that the amount of the metal particle based on the entire film is 55 volume% or more and that the amount of the polymer that has a polydimethylsiloxane structure is 5 volume% or more.

Further, it is preferable that the conductive adhesive film comprises a radical generator with a one-hour half-life temperature of 200°C or higher.

[0010a] In another aspect, there is provided a dicing die bonding film, which comprises the conductive adhesive film as defined above and a dicing tape laminated thereon.

[0010b] In another aspect, there is provided a method for processing semiconductor wafer using the conductive adhesive film as defined above.

[0010c] In another aspect, there is provided a method for processing semiconductor wafer using the dicing die bonding film as defined above.

Effect of the Invention

[0011] By dicing after adhering to a semiconductor wafer, the above-described adhesive film of the present ~~invention~~ disclosure allows semiconductor chips to be packaged on a lead frame, using proper quantities of the adhesive film in a state of lamination on the rear-side electrode.

Preferably, it contains a metal component with a melting point of 250°C or lower and can be sintered at a temperature of 250°C or lower, contains Cu, and is capable of

forming intermetallic compounds.

Further, because the binder resin is of a silicone-type, it shows high heat resistance up to a temperature of 300°C after sintering.

Furthermore, by combining a flux component that is in a state of phase separation with the silicone component, a silicone component modified by the functional group having flux function, a radical-type catalyst that accelerates the curing reaction of the silicone at a temperature of 200°C or higher, or a combination thereof, the intermetallic reaction proceeds smoothly, thereby enabling high conductivity.

Further, by including Cu, the film can be provided at a lower price than, for example, sintered silver, and since it does not include lead, environmental burden becomes low, too.

[0012] The adhesive film of the present ~~disclosure~~invention is especially suitable for adhering the rear-side electrode of a high-voltage, high-frequency power semiconductor to a lead frame etc., or for adhering a lead frame packaged with power semiconductors etc. to a heat dissipation member, and in particular, for packaging wide-gap semiconductor device, which is expected to operate at high temperature.

BRIEF DESCRIPTION OF DRAWINGS

[0013]

[FIG. 1] FIG. 1 shows an adhesive film with dicing tape that uses the adhesive agent 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

[0014] The present invention comprises at least a metal particle and a silicone-type resin that serves as a binder.

[0015] (Metal Particles)

The metal particle contains at least Cu. The form of the Cu particle is not