architecture, automobiles, and airplanes by virtue of the heat resistance and insulation properties of the polyimide resin, the adhesiveness and water resistance of the epoxy resin, and the low water absorbency and low thermal expansibility of the inorganic particles (for example, Patent Documents 1 to 3).

[0003]

Further, when metal electrodes of the semiconductor chip and the circuit board are solder welded, a flux material is used. A main function of the flux material is to make a solder joint clean, to prevent oxidation of a metal, and to enhance solder wettability. As the flux material, rosin-based materials are known (e.g., Patent Documents 4 and 5).

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0004]

Patent Document 1: Japanese Patent Laid-open Publication No. 2004-319823

Patent Document 2: JP 3995022 B1

Patent Document 3: Japanese Patent Laid-open Publication No. 2009-277818

Patent Document 4: Japanese Patent Laid-open Publication No. 2001-219294

Patent Document 5: Japanese Patent Laid-open Publication No.2005-059028

SUMMARY ~~OF THE INVENTION~~

PROBLEMS TO BE SOLVED ~~BY THE INVENTION~~

[0005]

In the case of a conventional adhesive agent, in flip chip assembly, a hardening reaction proceeds gradually due to heating for removing a water content by moisture absorption or heating in a semiconductor chip assembly process, and therefore there is a case where unstable electrical connection is caused because bump electrodes of a semiconductor chip are less likely to penetrate the adhesive agent or there is a case where connection reliability is poor because air bubbles are trapped in the adhesive agent. Further, there is a case where the adhesive agent is fluidized due to the aforementioned heating and becomes irregular in its thickness to cause poor connection reliability. Moreover, a semiconductor device produced using such a conventional adhesive agent also has a problem in that it may be difficult to maintain sufficient connection reliability when the semiconductor device is subjected to a process where higher durability is required such as a moisture absorption-reflow process or a thermal cycle process.

[0006]

In order to solve these problems, it is an object of the ~~present invention~~embodiments disclosed herein to provide an adhesive agent which has excellent storage life in heating conditions of a heat-drying process and an assembly process.

SOLUTIONS TO THE PROBLEMS

[0007]

~~The present invention pertains to~~In a first aspect, there is provided an adhesive agent comprising a polyimide (a), an epoxy compound (b), and an acid-modified rosin (c).

[0007a]

In a second aspect, there is provided an adhesive agent film comprising the adhesive agent as defined above.

[0007b]

In a third aspect, there is provided a semiconductor device including a hardened article of the adhesive agent as defined above or a hardened article of the adhesive agent film as defined above.

[0007c]

In a fourth aspect, there is provided a method for producing a semiconductor device, wherein the adhesive agent as defined above or the adhesive agent film as defined 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 to each other through application of heat and pressure.

EFFECTS ~~OF THE INVENTION~~

[0008]

According to the present ~~invention~~disclosure, an adhesive agent is provided which has excellent stability against heating treatment during a heat-drying process and an

assembly process.

EMBODIMENTS OF THE INVENTION

[0009]

The adhesive agent of the present invention is an adhesive agent comprising a polyimide (a), an epoxy compound (b), and an acid-modified rosin (c).

[0010]

The adhesive agent of the present invention contains the polyimide (a), and is therefore excellent in heat resistance and chemical resistance. Particularly, a hardened article having a higher-density network structure can be obtained by using a polyimide having, in its side chain, at least one highly polar functional group selected from the group consisting of a phenolic hydroxyl group, a sulfonic acid group, and a thiol group since the solubility in an organic solvent and the compatibility with an epoxy resin of polyimide are improved and a ring-opening reaction of the epoxy compound and an addition