DESCRIPTION

HEAT-RESISTANT THERMALLY CONDUCTIVE COMPOSITION AND HEAT-RESISTANT THERMALLY CONDUCTIVE SHEET

Technical Field

[0001] The present invention relates to a heat-resistant thermally conductive composition and a heat-resistant thermally conductive sheet suitable for being interposed between a heat generating part and a heat dissipater of an electrical component, an electronic component or the like.

Background Art

[0002] Recently, the performance of semiconductors such as CPUs has improved appreciably, and the amounts of heat generated by the semiconductors have increased enormously. To cope with this, heat dissipaters are attached to electronic components that generate heat, and thermally conductive silicone sheets are adopted to improve the contact between the semiconductors and the heat dissipaters. Further, along with the size reduction, high performance, and high integration of devices, the thermally conductive silicone sheets are required to have softness and high thermal conductive properties. Conventionally, Patent Documents 1 to 4 propose thermally conductive silicone gel sheets.

Prior Art Documents

Patent Documents

[0003] Patent Document 1: JPWO 2018-016566 A1

Patent Document 2: JP 5931129 B2

Patent Document 3: WO 2018/074247 A1

Patent Document 4: JP 2017-210518 A

Disclosure ~~of Invention~~

Problem to be Solved ~~by the Invention~~

[0004] However, conventional thermally conductive silicone sheets have relatively

high heat resistance, but still have been required to have higher heat resistance. Specifically, highly thermally conductive silicone sheets become hard at high temperature due to an increase in the amount of a filler filled or the use of a highly thermally conductive filler, and thus need to be improved.

Moreover, in the semiconductor field, the contamination by metal impurities has been a problem, and thus there has been a demand for heat-dissipating members that do not contain a heat resistance improver or a pigment made of a metal oxide or a metal complex.

[0005] To solve the above conventional problems, ~~embodiments~~examples of the present ~~invention~~disclosure provide a heat-resistant thermally conductive composition and a heat-resistant thermally conductive sheet that use a heat resistance improver containing no metal atom and that are less likely to become hard at high temperature.

Means for Solving Problem

[0006] According to a first aspect of the present disclosure~~invention~~, there is provided a heat-resistant thermally conductive composition including: a matrix resin; and thermally conductive particles, wherein the matrix resin is a silicone polymer, the heat-resistant thermally conductive composition contains a benzimidazolone compound as a heat resistance improver, and considering an amount of the matrix resin to be 100 parts by mass, the thermally conductive particles are added in an amount of 100 to 4000 parts by mass.

[0007] According to a second aspect of the present ~~invention~~disclosure, there is provided a heat-resistant thermally conductive sheet comprising the above heat-resistant thermally conductive composition in the form of a sheet.

Effects ~~of the Invention~~

[0008] In ~~embodiments~~ examples of the present ~~invention~~disclosure, the heat-resistant thermally conductive composition contains a matrix resin and thermally conductive particles, and contains a benzimidazolone compound as a heat resistance improver. Thus, ~~embodiments~~examples of the present ~~invention~~ disclosure can provide the heat-resistant thermally conductive composition and the heat-resistant thermally conductive sheet that are less likely to become hard at high temperature. The benzimidazolone compound is usually known to be added as a pigment, but exhibits unpredictable effects of improving heat resistance. Moreover, the heat-resistant thermally conductive composition and the heat-resistant thermally conductive sheet use the heat resistance improver containing no metal atom and are less likely to become hard at high temperature. Thus, they are largely advantageous

CLAIMS

1. A heat-resistant thermally conductive composition comprising:

a matrix resin; and

thermally conductive particles,

wherein the matrix resin is a silicone polymer,

the heat-resistant thermally conductive composition contains a benzimidazolone compound as a heat resistance improver, and

considering an amount of the matrix resin to be 100 parts by mass, the thermally conductive particles are added in an amount of 100 to 4000 parts by mass.

2. The heat-resistant thermally conductive composition according to claim 1, wherein the benzimidazolone compound is added in an amount of 0.001 to 5 parts by mass with respect to 100 parts by mass of the heat-resistant thermally conductive composition.

~~3. The heat-resistant thermally conductive composition according to claim 1 or 2, wherein the matrix resin is a silicone polymer.~~

~~4~~3. The heat-resistant thermally conductive composition according to ~~any of claims 1 to 3~~claim 1 or 2, wherein the benzimidazolone compound is a benzimidazolone pigment.

~~5~~4. The heat-resistant thermally conductive composition according to any of claims 1 to ~~4~~3, further comprising a curing catalyst,

wherein the matrix resin is an addition-curable silicone polymer.

~~6~~5. The heat-resistant thermally conductive composition according to any of claims 1 to ~~5~~4, wherein the heat-resistant thermally conductive composition has an Asker C hardness of 70 or less after curing.

~~7~~6. The heat-resistant thermally conductive composition according to any of claims 1 to ~~6~~5, wherein the thermally conductive particles are at least one selected from alumina, zinc oxide, magnesium oxide, aluminum nitride, boron nitride, aluminum hydroxide, and silica.

~~8~~7. The heat-resistant thermally conductive composition according to any of claims 1 to ~~7~~6, wherein part or all of the thermally conductive particles are surface treated with a silane coupling agent.

~~9~~8. The heat-resistant thermally conductive composition according to claim ~~8~~7, wherein the silane coupling agent is added in an amount of 0.01 to 10 parts by mass with respect to 100 parts by mass of the thermally conductive particles.

~~10~~9. The heat-resistant thermally conductive composition according to any of claims 1 to ~~9~~8, wherein the heat-resistant thermally conductive composition comprises the following components (A) to (E), and is cured:

(A) a base polymer component: an organopolysiloxane having an average of two or more silicon atoms bonded to alkenyl groups per molecule;

(B) a crosslinking component: an organopolysiloxane having an average of two or more silicon atoms bonded to hydrogen atoms per molecule, in which an amount of the organopolysiloxane is 0.01 to 3 mol with respect to 1 mol of the alkenyl groups bonded to the silicon atoms in the component A;

(C) a catalyst component: a platinum group metal catalyst, in which an amount of the platinum group metal catalyst is 0.01 to 1000 ppm in terms of a weight unit of metal atoms with respect to a total amount of the component A and the platinum group metal catalyst;

(D) thermally conductive particles: 100 to 4000 parts by mass with respect to 100 parts by mass of an addition-curable silicone polymer component (the component A + the component B); and

(E) a benzimidazolone compound: 0.001 to 5 parts by mass with respect to 100 parts by mass of the heat-resistant thermally conductive composition.

~~11~~10. The heat-resistant thermally conductive composition according to any of claims 1 to ~~10~~9, wherein the heat resistance improver contains no metal atom.

~~12~~11. A heat-resistant thermally conductive sheet comprising the heat-resistant thermally conductive composition, according to any of claims 1 to ~~11~~10, in the form of a sheet.

~~13~~12. The heat-resistant thermally conductive sheet according to claim ~~12~~11, wherein the heat-resistant thermally conductive sheet has a thermal conductivity of 0.8 W/m·K or more.

~~14~~13. The heat-resistant thermally conductive sheet according to claim ~~12~~11 or ~~13~~12, wherein the heat-resistant thermally conductive sheet has a thickness of 0.2 to 10 mm.