PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	14.03.2017
Applicant's or agent's file reference FP16-0924-00	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2017/004175	06.02.2017	10.02.2016

International Patent Classification (IPC) or both national classification and IPC

H01B5/00(2006.01)i, C09J7/00(2006.01)i, C09J9/02(2006.01)i, C09J11/00(2006.01)i, H01B1/00(2006.01)i, H01B1/22(2006.01)i, H01B5/16(2006.01)i, HOlR11/01(2006.01)i

Applicant

HITACHI CHEMICAL COMPANY, LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/JP	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2017/004175

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2017/004175

Box No. V **Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-14	YES
	Claims		NO
Inventive step (IS)	Claims	7	YES
	Claims	1-6, 8-14	NO
Industrial applicability (IA)	Claims	1-14	YES
	Claims		NO

2. Citations and explanations:

Document 1: JP 2015-187983 A (SEKISUI CHEMICAL CO., LTD.) 29 October 2015, paragraphs [0083], [0106], [0132], [0148]-[0157], [0179]-[0181] (Family: none)

Document 2: JP 2015-187984 A (SEKISUI CHEMICAL CO., LTD.) 29 October 2015, paragraphs [0097], [0118], [0144], [0160]-[0169], [0191]-[0193] (Family: none)

Document 3: JP 2014-017213 A (HITACHI CHEMICAL CO., LTD.) 30 January 2014, paragraph [0081] (Family: none)

Document 4: JP 2010-050086 A (HITACHI CHEMICAL CO., LTD.) 04 March 2010, claims, paragraphs [0015], [0023], [0052], [0068], [0069], [0088]-[0106], [0112] (Family: none)

The invention as in claim 1 does not involve an inventive step in the light of document 1 cited in the ISR.

Document 1 discloses in example 1 conductive particles with insulating particles (corresponding to the

"insulation coated conductive particles" of the present application) comprising conductive particles A (corresponding to the "conductive particles" of the present application) and a plurality of insulating particles attached on the surface of the conductive particles A, wherein the insulating particles comprise first insulating particles (corresponding to the "first insulating particles" of the present application) having an average particle diameter of 300 nm and second insulating particles (corresponding to the "second insulating particles" of the present application) having an average particle diameter of 100 nm.

Although document 1 does not specifically disclose the average particle diameter of the conductive particles A, because resin particles that form the conductive particles A have an average particle diameter of 3 μm (paragraph [0148]) and a nickel layer provided thereon has a thickness of 0.1 μm (paragraph [0153]), it would be apparent that the conductive particles A have an average particle diameter in the range of "1-10 μm inclusive".

As document 1 (paragraph [0106]) indicates that the second insulating particles are preferably silica particles, a person skilled in the art could easily use the second insulating particles which are silica particles in example 1 of document 1.

The invention as in claim 2 does not involve an inventive step in the light of document 1.

The first insulating particles used in document 1, example 1 are one having Tg (glass transition temperature) of 100°C (paragraph [0154]).

Box No. V **Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

The invention as in claim 3 does not involve an inventive step in the light of document 1 and document 3 cited in the ISR.

As it was conventionally known that the coating ratio by conductive particles of first insulating particles and second insulating particles was preferably 35%-75% (see document 3, paragraph [0081], etc.), a person skilled in the art could easily select a value of the coating ratio in the range of 35%-75% in the invention disclosed in document 1.

The invention as in claim 4 does not involve an inventive step in the light of document 1.

Document 1 (paragraph [0157]) discloses "conductive particles with protrusions".

The invention as in claims 5, 6 and 8 does not involve an inventive step in the light of document 1 and document 4 cited in the ISR.

Document 4 (in particular, see claims, paragraphs [0015], [0023], [0052], [0068], [0069], [0088]-[0106], [0112]) discloses a well-known feature in which silicone oligomers (corresponding to the "siloxane hydrophobicity-imparting agent" of the present application) containing siloxane units are attached on insulating microparticles, thereby enabling to maintain high insulating property. As the invention disclosed in document 1 is to address a problem of increasing insulation reliability (paragraph [0010]), a person skilled in the art could easily attach silicone oligomers containing siloxane units to the insulating particles in the invention disclosed in document 1 in order to further increase the insulation

reliability. On this occasion, it is a mere exercise of ordinary creativity of a person skilled in the art to optimize the degree of hydrophobicity.

The invention as in claim 9 does not involve an inventive step in the light of document 1.

Document 1 (paragraph [0153]) indicates that "a nickel layer was formed on the resin particles to obtain conductive particles A". The "nickel layer" corresponds to the "first layer containing nickel" in the invention as in claim 9.

The invention as in claim 10 does not involve an inventive step in the light of document 1.

Document 1 (paragraph [0083]) indicates that the conductive layer may have a bi-layer structure and the outermost layer is preferably a gold layer. The "gold" corresponds to the "noble metal" in the invention as in claim 10.

The invention as in claim 11 does not involve an inventive step in the light of document 1.

The "epoxy compound which is a thermosetting compound" and the "anisotropic conductive paste" in the invention disclosed in document 1 (in particular, see paragraph [0179]) respectively correspond to the "adhesive" and the "anisotropic conductive adhesive" in the invention as in claim 11.

The invention as in claim 12 does not involve an inventive step in the light of document 1.

Document 1 (paragraph [0132]) discloses an

embodiment in which a conductive material is used as an anisotropic conductive film.

The invention as in claims 13 and 14 does not involve an inventive step in the light of document 1.

The "transparent glass substrate comprising an ITO electrode pattern formed on the upper surface thereof" and the "semiconductor chip comprising a copper electrode pattern formed on the lower surface thereof" in the invention disclosed in document 1 (in particular, see paragraphs [0180], [0181]) respectively correspond to the "first circuit member having a first circuit electrode" and the "second circuit component having a second circuit electrode", in the invention as in claims 13 and 14, respectively.

The invention as in claim 1 does not involve an inventive step in the light of document 2 cited in the ISR.

Document 2 discloses in example 1 conductive particles with insulating particles (corresponding to the "insulation coated conductive particles" of the present application) comprising conductive particles A (corresponding to the "conductive particles" of the present application) and a plurality of insulating particles attached on the surface of the conductive particles A, wherein the insulating particles comprise first insulating particles (corresponding to the "first insulating particles" of the present application) having an average particle diameter of 300 nm and second insulating particles (corresponding to the "second insulating particles" of the present application) having

an average particle diameter of 100 nm.

Although document 2 does not specifically disclose the average particle diameter of the conductive particles A, because resin particles that form the conductive particles A have an average particle diameter of 3 μm (paragraph [0160]) and a nickel layer provided thereon has a thickness of 0.1 μm (paragraph [0165]), it would be apparent that the conductive particles A have an average particle diameter in the range of "1-10 μm inclusive".

As document 2 (paragraph [0118]) indicates that the second insulating particles are preferably silica particles, a person skilled in the art could easily use the second insulating particles which are silica particles in example 1 of document 2.

The invention as in claim 2 does not involve an inventive step in the light of document 2.

The first insulating particles used in document 2, example 1 are one having Tg (glass transition temperature) of 100°C (paragraph [0166]).

The invention as in claim 3 does not involve an inventive step in the light of documents 2 and 3.

As it was conventionally known that the coating ratio by conductive particles of first insulating particles and second insulating particles was preferably 35%-75% (see document 3, paragraph [0081], etc.), a person skilled in the art could easily select a value of the coating ratio in the range of 35%-75% in the invention disclosed in document 2.

The invention as in claim 4 does not involve an

inventive step in the light of document 2.

Document 2 (paragraph [0169]) discloses "conductive particles with protrusions".

The invention as in claims 5, 6 and 8 does not involve an inventive step in the light of document 2 and 4.

Document 4 (in particular, see claims, paragraphs [0015], [0023], [0052], [0068], [0069], [0088]-[0106], [0112]) discloses a well-known feature in which silicone oligomers (corresponding to the "siloxane hydrophobicity-imparting agent" of the present application) containing siloxane units are attached on insulating microparticles, thereby enabling to maintain high insulating property. As the invention disclosed in document 2 is to address a problem of increasing insulation reliability (paragraph [0010]), a person skilled in the art could easily attach silicone oligomers containing siloxane units to the insulating particles in the invention disclosed in document 2 in order to further increase the insulation reliability. On this occasion, it is a mere exercise of ordinary creativity of a person skilled in the art to optimize the degree of hydrophobicity.

The invention as in claim 9 does not involve an inventive step in the light of document 2.

Document 2 (paragraph [0165]) indicates that "a nickel layer was formed on the resin particles to obtain conductive particles A". The "nickel layer" corresponds to the "first layer containing nickel" in the invention as in claim 9.

Box No. V **Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

The invention as in claim 10 does not involve an inventive step in the light of document 2.

Document 2 (paragraph [0097]) indicates that the conductive layer may have a bi-layer structure and the outermost layer is preferably a gold layer. The "gold" corresponds to the "noble metal" in the invention as in claim 10.

The invention as in claim 11 does not involve an inventive step in the light of document 2.

The "epoxy compound which is a thermosetting compound" and the "anisotropic conductive paste" in the invention disclosed in document 2 (in particular, see paragraph [0191]) respectively correspond to the "adhesive" and the "anisotropic conductive adhesive" in the invention as in claim 11.

The invention as in claim 12 does not involve an inventive step in the light of document 2.

Document 2 (paragraph [0144]) discloses an embodiment in which a conductive material is used as an anisotropic conductive film.

The invention as in claims 13 and 14 does not involve an inventive step in the light of document 2.

The "transparent glass substrate comprising an ITO electrode pattern formed on the upper surface thereof" and the "semiconductor chip comprising a copper electrode pattern formed on the lower surface thereof" in the invention disclosed in document 2 (in particular, see paragraphs [0192], [0193]) respectively correspond to the "first circuit member having a first circuit electrode"

Box No. V **Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

and the "second circuit component having a second circuit electrode", in the invention as in claims 13 and 14, respectively.

The invention as in claim 7 is not disclosed in any of documents 1-4 and would not have been conceived of by a person skilled in the art, and thus is novel and involves an inventive step.

In particular, none of documents 1-4 discloses the feature of using a hydrophobicity-imparting agent which coats the surface of the second insulating particles selected from the group consisting of hexamethylenedisilazane, polydimethylsiloxane and (N,N-dimethylamino)trimethylsilane.