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)*	07.11.2017
Applicant's or agent's file reference: 160355WO01	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2017/029817	21.08.2017	23.08.2016

International Patent Classification (IPC) or both national classification and IPC
C03C3/087(2006.01)i, C03C3/091(2006.01)i, C03C3/093(2006.01)i

Applicant
AGC INC.

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/JP2017/029817

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/JP2017/029817

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	2	YES
	Claims	1, 3-14	NO
Inventive step (IS)	Claims	2	YES
	Claims	1, 3-14	NO
Industrial applicability (IA)	Claims	1-14	YES
	Claims		NO

2. Citations and explanations:

Document 1: WO 2012/077609 A1 (ASAHI GLASS CO., LTD.) 14 June 2012, paragraph [0033], tables 1-5 & US 2013/0274086 A1, tables 1-5 & US 2016/0002095 A1 & EP 2650262 A1 & CN 103261109 A & KR 10-2013-0129971 A & TW 201223910 A

Document 2: US 2013/0210962 A1 (OCV INTELLECTUAL CAPITAL, LLC.) 15 August 2013, table 4 & WO 2012/001656 A2 & CN 103038185 A

Document 3: JP 61-236631 A (OHARA OPTICAL GLASS MFG. CO., LTD.) 21 October 1986, table 1 (Family: none)

Document 4: JP 2014-500848 A (SCHOTT AG.) 16 January 2014, tables 3-5 & US 2014/0005027 A1, tables 3-5 & WO 2012/076289 A2 & DE 102010054967 A & CN 103249688 A

The invention as in claims 1 and 3-14 lacks novelty and does not involve an inventive step in the light of document 1 cited in the ISR.

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**

Document 1 (paragraph [0033], tables 1-5) discloses examples (see examples 1-7, 9-13, 15, 17-25, 28 and 30-31) judged as being alkali-free glasses which are characterized by containing, in mol% on an oxide basis, 65-75 of SiO_2, 9-15 of Al_2O_3, 0-3 of B_2O_3, 0-12 of MgO, 0-8 of CaO, 0-6 of SrO, and 0-5 of BaO, wherein MgO + CaO + SrO + BaO is 12-22, $4.84[Fe_2O_3] + 5.65[Na_2O] + 4.03[K_2O] + 4.55[SnO_2]$ is 0.55 or less, and having a compaction of 80 ppm or less.

Document 1 does not explicitly indicate that the compaction is 50 ppm or less, but paragraph [0033] indicates that it is preferable to suppress compaction, and because the composition of the alkali-free glass is the same as that in the present invention, it is considered that the invention disclosed in document 1 will have a compaction of 50 ppm or less.

Therefore, the invention as in claims 1 and 3-14 is identical to the invention disclosed in document 1.

The invention as in claims 1 and 3-14 lacks novelty and does not involve an inventive step in the light of document 2 cited in the ISR.

Document 2 (table 4) discloses an example (example 2) judged as being an alkali-free glass which is characterized by containing, in mol% on an oxide basis, 65-75 of SiO_2, 9-15 of Al_2O_3, 0-3 of B_2O_3, 0-12 of MgO, 0-8 of CaO, 0-6 of SrO, and 0-5 of BaO, wherein MgO + CaO + SrO + BaO is 12-22, $4.84[Fe_2O_3] + 5.65[Na_2O] + 4.03[K_2O] + 4.55[SnO_2]$ is 0.55 or less, and having a compaction of 80 ppm or less.

Document 2 does not explicitly indicate that the

compaction is 50 ppm or less, but because the composition of the alkali-free glass is the same as that in the present invention, it is considered that the invention disclosed in document 2 will have a compaction of 50 ppm or less.

Therefore, the invention as in claims 1 and 3-14 is identical to the invention disclosed in document 2.

The invention as in claims 1 and 3-14 lacks novelty and does not involve an inventive step in the light of document 3 cited in the ISR.

Document 3 (table 1) discloses examples assessed as being alkali-free glasses which are characterized by containing, in mol% on an oxide basis, 65-75 of SiO_2, 9-15 of Al_2O_3, 0-3 of B_2O_3, 0-12 of MgO, 0-8 of CaO, 0-6 of SrO, and 0-5 of BaO, wherein MgO + CaO + SrO + BaO is 12-22, $4.84[Fe_2O_3] + 5.65[Na_2O] + 4.03[K_2O] + 4.55[SnO_2]$ is 0.55 or less, and having a compaction of 80 ppm or less (see no. 10, 13).

Document 3 does not explicitly indicate that the compaction is 50 ppm or less, but because the composition of the alkali-free glass is the same as that in the present invention, it is considered that the invention disclosed in document 3 will have a compaction of 50 ppm or less.

Therefore, the invention as in claims 1 and 3-14 is identical to the invention disclosed in document 3.

The invention as in claims 1 and 3-11 lacks novelty and does not involve an inventive step in the light of document 4 cited in the ISR.

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**

Document 4 (tables 3-5) discloses examples (C5 in table 3; E1 and E2 in table 4; C16 in table 5) judged as being alkali-free glasses which are characterized by containing, in mol% on an oxide basis, 65-75 of SiO_2, 9-15 of Al_2O_3, 0-3 of B_2O_3, 0-12 of MgO, 0-8 of CaO, 0-6 of SrO, and 0-5 of BaO, wherein MgO + CaO + SrO + BaO is 12-22, $4.84[Fe_2O_3] + 5.65[Na_2O] + 4.03[K_2O] + 4.55[SnO_2]$ is 0.55 or less, and having a compaction of 80 ppm or less.

Document 4 does not explicitly indicate that the compaction is 50 ppm or less, but because the composition of the alkali-free glass is the same as that in the present invention, it is considered that the invention disclosed in document 4 will have a compaction of 50 ppm or less.

Therefore, the invention as in claims 1 and 3-14 is identical to the invention disclosed in document 4.

The invention as in claims 12-14 lacks novelty in the light of document 4 cited in the ISR.

A person skilled in the art could have used, as appropriate, the invention disclosed in document 4 (tables 3-5) as a display substrate glass having a metal or oxide thin film or the like on a surface, or could have used, as appropriate, in a liquid crystal display device, an organic EL device or a lighting device (if necessary, see documents 1-3).

The invention as in claim 2 is novel and involves an inventive step in relation to the documents cited in the ISR.

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**

None of the documents cited in the ISR discloses an alkali-free glass containing, in mol% on an oxide basis, 65-70 of SiO_2, 9-15 of Al_2O_3, 0-3 of B_2O_3, 5-12 of MgO, 3-8 of CaO, 1-6 of SrO, 0-4 of BaO, 0.001-0.03 of Fe_2O_3, 0.003-0.06 of Na_2O, 0-0.02 of K_2O, 0-0.12 of SnO_2 and 0-2 of ZrO_2, wherein MgO + CaO + SrO + BaO is 15-22, MgO/(MgO + CaO + SrO + BaO) is 0.33 or more, MgO/(MgO + CaO) is 0.40 or more, MgO/(MgO + SrO) is 0.45 or more, and $4.84[Fe_2O_3] + 5.65[Na_2O] + 4.03[K_2O] + 4.55[SnO_2]$ is 0.55 or less.