

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43*bis*.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2018/073087

International filing date (day/month/year)
28.08.2018

Priority date (day/month/year)
29.08.2017

International Patent Classification (IPC) or both national classification and IPC
INV. C01B33/158 C04B14/06 C08G18/50

Applicant
COVESTRO DEUTSCHLAND AG

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 and 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 usually 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:



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Date of completion of this opinion

see form
PCT/ISA/210

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Box No. I Basis of the 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 43bis.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 13ter.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 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.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:

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)	Yes: Claims	<u>2-11</u>
	No: Claims	<u>1</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-11</u>
Industrial applicability (IA)	Yes: Claims	<u>1-11</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents; the numbering will be adhered to in the rest of the procedure.

D1: US 8 067 478 B1 (MEADOR MARY ANN B [US] ET AL) 29 November 2011 (2011-11-29)

D2: US 7 732 496 B1 (LEVENTIS NICHOLAS [US] ET AL) 8 June 2010 (2010-06-08)

D3: WO 2007/126410 A2 (ASPEN AEROGELS INC [US]; RHINE WENDELL E [US]; OU DUAN LI [US]; SONN J) 8 November 2007 (2007-11-08)

D4: US 2010/292428 A1 (MEADOR MARY ANN B [US] ET AL) 18 November 2010 (2010-11-18)

2 Independent **claim 1**

2.1 Novelty (Article 33(2) PCT)

Document D1 can be regarded as being the closest prior art to the subject-matter of present independent claim 1 and discloses a composite aerogel obtained by reacting a system comprising the following components:

An isocyanate (Bayer Desmodur N3200; di-isocyanate oligomer);

A compound containing an isocyanate reactive group, preferably a compound containing an amine group and/or a hydroxyl group (Huntsman diamine XTJ-502);

An amino silane coupling agent (APTES);

An optional silicon compound capable of forming silicon skeletons and different from the amino silane coupling agent (TMOS);

An organic solvent, preferably one or more selected from the group consisting of: acetone, methanol, ethanol, isopropanol and tetrahydrofuran (acetonitrile); and

Water (3.5 ml; all features are disclosed in example 3).

The content of silicon groups present in the composite aerogel is no more than 30 wt %, based on that the weight of the composite aerogel is 100 wt% (given the amounts of Si based compounds, i.e. approx. 24 mmol vs 2 g of di-isocyanate it is obvious that the amount of Si is less than 30% wt.).

The wet gel is dried to obtain the composite aerogel (e.g. claim 1).

The reactions of step a) and b) are carried out at 78 °C (acetone - dry ice bath).

The mass ratio of TMOS (Mw 152.22) and APTES (Mw 227.37) is approximately 3:1 (19.67 mmol TMOS, 4.16 mmol APTES).

Thus, all technical features of claim 1 are disclosed in document D1.

Therefore, the lack of clarity notwithstanding, the subject - matter of said claim is not new in the sense of Article 33(2) PCT) over document D1.

5.1b) The reasoning under 5.1a also applies in view of document D2 (cf. example 2 and the co-polymerisation of TEOS and APTES. The amine and hydroxyl groups of the silicon based compounds double as "isocyanate - functional groups).

3 Independent claims 10 and 11

It is considered as being a routine operation for the person skilled in the art to use the materials made by the method as recited in claims 1 - 9 in thermal insulation material (since this is the most common use of such materials). Such use is also disclosed in documents D3 and D4 (cf. citations in the Search Report).

Therefore, novelty and/or inventive step in the sense of Article 33(2)(3) can not be acknowledged for independent claims 10 and 11 (cf. VIII, 1. and 1.3).

4 Dependent claims 1 - 9

Dependent claims 1 - 9 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step.

Re Item VIII

Certain observations on the international application

1 Clarity (Article 6 PCT)

The application does not meet the requirements of Article 6 PCT, because present claims 1, 10 and 11 are not clear.

1.1 Claim 1 reads: "an isocyanate having a functionality of 2 to 4."

It is not clear what the functionality refers to. It is not clear whether this is meant to define the amount of functional groups or the amount of chemically different functional groups.

1.2 Claim 10 reads: "Use of the composite aerogel prepared according to any one of claims 1 - 9 for preparing a thermal insulation material."

Where a claim defines a product in terms of the process by which the product is made, the claim as a whole is directed to a product. Such a claim lacks novelty if a prior art product, even if made by an undisclosed process, appears to be inherently the same as, or indistinguishable from, the claimed invention (Guidelines 5.26)

Therefore, the use claims is directed to an indefinite product.

1.3 The same applies to independent claim 13.

2 Lack of support (Article 6 PCT)

There is no substantiation by experimental data for the use of any silicon compound other than TEOS and APTES. The latter is the sole cross-link agent mentioned in the entire description.

The isocyanates are restricted to diphenylmethane isocyanate derivatives.

Thus, the choice of reactants is highly selective and it is not credible that the invention would work over the whole range claimed.

Therefore, the subject-matter recited in claim 1 and any claim referring to it, has to be considered as being a highly speculative and generalised postulation of features for which effects have not been demonstrated.