PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

<table>
<thead>
<tr>
<th>Applicant’s or agent’s file reference</th>
<th>FOR FURTHER ACTION</th>
<th>See item 4 below</th>
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<tr>
<td>STI-016PCT</td>
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<tr>
<td>International application No.</td>
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<td>PCT/US2015/043452</td>
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<tr>
<td>International filing date (day/month/year)</td>
<td>03 August 2015 (03.08.2015)</td>
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<td>Priority date (day/month/year)</td>
<td>04 August 2014 (04.08.2014)</td>
<td></td>
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<tr>
<td>See relevant information in Form PCT/ISA/237</td>
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<tr>
<td>Applicant</td>
<td>SOLIDIA TECHNOLOGIES, INC.</td>
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1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

   ☒ Box No. I  Basis of the report
   ☐ 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 Article 35(2) 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

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

Date of issuance of this report
07 February 2017 (07.02.2017)

Authorized officer
Yukari Nakamura

e-mail: pct.team7@wipo.int

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Form PCT/IB/373 (January 2004)
# PATENT COOPERATION TREATY

## PCT

**WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

To:  
Yin Philip Zhang, Ph. D.  
Attorney for Applicants  
Milstein Zhang & Wu LLC  
2000 Commonwealth Ave. Suite 400  
Newton, MA 02466  
United States of America

Date of mailing *(day/month/year)*  
17 December 2015 *(17.12.2015)*

Applicant’s or agent’s file reference  
STI-016PCT

FOR FURTHER ACTION  
See paragraph 2 below

<table>
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<tr>
<th>International application No.</th>
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<td>04 August 2014 <em>(04.08.2014)</em></td>
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</table>

International Patent Classification (IPC) or both national classification and IPC:  
**C04B 28/02** *(2006.01)*  
**C04B 40/02** *(2006.01)*

Applicant  
SOLIDIA TECHNOLOGIES, INC.

1. This opinion contains indications relating to the following items:
   - [x] Box No. I Basis of the opinion
   - [ ] Box No. II Priority
   - [x] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - [ ] Box No. IV Lack of unity of invention
   - [x] Box No. V Reasoned statement under Rule 43bis.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 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 66.1bis(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/RU:  
Federal Institute of Industrial Property,  
Berezhkovskaya nab., 30-1, Moscow, G-59,  
GSP-3, Russia, 125993  
Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37

Date of completion of this opinion  
26 November 2015 *(26.11.2015)*

Authorized officer  
V. Kryukova  
Telephone No, 499-240-25-91

Form PCT/ISA/237 (cover sheet) (January 2015)
Box No. 1 Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [X] 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 filed or furnished:
   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 in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:
<table>
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<tr>
<th>Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</th>
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<tr>
<td>The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:</td>
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<tr>
<td>□ the entire international application.</td>
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<tr>
<td>□ claims Nos. 4-22 because:</td>
</tr>
<tr>
<td>□ the said international application, or the said claims Nos. _______________________________ relate to the following subject matter which does not require an international search (specify):</td>
</tr>
<tr>
<td>□ the description, claims or drawings (indicate particular elements below) or said claims Nos. are so unclear that no meaningful opinion could be formed (specify):</td>
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<tr>
<td>□ the claims, or said claims Nos. _______________________________ are so inadequately supported by the description that no meaningful opinion could be formed (specify):</td>
</tr>
<tr>
<td>□ no international search report has been established for said claims Nos. 4-22</td>
</tr>
<tr>
<td>□ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:</td>
</tr>
<tr>
<td>□ furnish a sequence listing in the form of an Annex C/ST.25 text file, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.</td>
</tr>
<tr>
<td>□ furnish a sequence listing on paper or in the form of an image file complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.</td>
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<tr>
<td>□ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).</td>
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<td>□ See Supplemental Box for further details.</td>
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1. **Statement**

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<tr>
<th>Novelty (N)</th>
<th>Claims</th>
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<tbody>
<tr>
<td>Claims</td>
<td></td>
<td></td>
<td>NO</td>
</tr>
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2. **Citations and explanations:**

D2: CN 101139182 A, 12.03.2008  

D1 is the closest prior art to inventions being claimed. D1 discloses a composition comprising calcium silicate selected from discrete calcium silicate phases selected from wollastonite and an amorphous calcium silicate phase at about 30% or more by mass of the total phases, as calcium silicate may exist in amorphous phase, in crystalline shape, or in a combination thereof [0037] and [0051]. Elemental Ca and elemental Si are present in the composition at a molar ratio from about 0.8 to about 1.2; and metal oxides of Al, Fe and Mg are present in the composition at about 30% or less by mass. Binders and filler particles are fused together as a result of reaction running in CO₂-containing atmosphere forming CaCO₃ as the wollastonite core surrounded with particles of calcium silicate being carbonized providing CaCO₃ weight content up to 100% (see D1, claim, par. [0014], [0037], [0041], [0043], [0051] - [0054], [0078], [0085], [00134] and [00144], table 7).

The invention according to independent claim 1 differs from D1 in that the composition is carbonated with CO₂ at a temperature of about 30°C to about 90°C.

Consequently, claims 1-3 and 27 meet the criterion of novelty.

However, D2 (abstract) discloses the carbonization of composition comprising calcium silicate with CO₂ at a temperature of about 30°C to about 90°C.

Therefore, independent claims 1 and 27 do not meet the criterion of inventive step.  
D1 (claim, par. [0051]-[0053]) discloses the composition comprising one or more residual SiO₂ and CaO phases.

Consequently, dependent claim 2 does not meet the criterion of inventive step.  
Dependent claim 3 meets the criterion of inventive step as the composition comprising one or more melilite type phases having general formulae disclosed in claim 3 is not known from prior art.
The carbonatable calcium silicate composition in powder form having a mean particle size (d50) of about 8 \( \mu \text{m} \) to about 25 \( \mu \text{m} \), with 10% of particles (d10) sized below about 0.1 \( \mu \text{m} \) to about 3 \( \mu \text{m} \), and 90% of particles (d90) sized above about 35 \( \mu \text{m} \) to about 100 \( \mu \text{m} \) is not known from prior art. Said composition allows to lesser water consumption in molding goods and allows increasing goods' durability.

Consequently, claims 22-26 meet the criterion of novelty and the criterion of inventive step. Claims 1-3 and 23-27 meet the criterion of industrial applicability.