PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

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.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2019/082729	27.11.2019	27.11.2018

International Patent Classification (IPC) or both national classification and IPC
INV. B01L3/00 ADD. B01L7/00

Applicant
STILLA TECHNOLOGIES

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 notifed 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:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Ruiz-Echarri Rueda Telephone No. +31 70 340-0

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2019/082729

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 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:

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

1. Statement

Novelty (N)	Yes:	Claims	5, 8
	No:	Claims	1-4, 6, 7, 9-17
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-17
Industrial applicability (IA)	Yes:	Claims	1-17
	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

Reference is made to the following documents:

D1 US 2010/029512 A1 (DAVIES MARK [IE] ET AL) 4 February 2010 (2010-02-04)

D2 US 2007/042503 A1 (HANDIQUE KALYAN [US] ET AL) 22 February 2007 (2007-02-22)

D3 US 2006/094119 A1 (ISMAGILOV RUSTEM F [US] ET AL) 4 May 2006 (2006-05-04)

1 **Re Item V**

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

1.1 The subject-matter of the independent apparatus claim 1 is not considered to be novel over D1 in the sense of Art. 33(2) PCT because all its technical features are disclosed in the paragraphs cited. D1 discloses in paragraphs [0044]-[0046] and in figures 1A-G:
A microfluidic chip (1) comprising at least one inlet microchannel (2), at least one output channel (4) and at least one droplet chamber (5), wherein the minimal distance between the output channel (4) and the inlet microchannel (2) is at most about 50% of the largest dimension in the base plan (x/y) of the droplet chamber (5) (cf. D1, [0045]).

1.2 The embodiment anticipated by D1 in the paragraphs [0050]-[0051] and in figures 3A-D also anticipate all the technical features of claim 1. Note that from the cited figures it is unambiguously disclosed that the inlet (18) is positioned at the center of the axis "y", which is understood to be the largest dimension of the base plan (x/y) of the droplet chamber (21). Therefore, the minimal distance between the inlet (18) and the outlet (20) is at most 50% of said dimension.

1.3 D2 also discloses all the technical features of claim 1 in the passages cited (cf. D2, [0101] and figure 4A), wherein D2 discloses: A microfluidic chip (110) comprising at least one inlet microchannel (120), at least one output channel (130) and at least one droplet chamber (180), wherein the minimal distance between the output channel and the inlet microchannel is at most about 50% of the largest dimension in the base plan (x/y) of the droplet chamber (180) (cf. D2, fig. 4).

1.4 Also D3 discloses all the technical features of claim 1 in the paragraphs [0021] [0057] and in figure 12 wherein the inlet microchannel is defined by the channel comprising (8), the outlet microchannel is defined by the channel comprising (6) and the droplet chamber by the chamber comprising (6), (9) and (10) (wherein the channel is considered to be the chamber).

Therefore, the subject-matter of independent claim 1 is not considered to be novel over D1, D2 and D3 in the sense of Art. 33(2) PCT.

1.5 The subject-matter of the independent method claim 13 is anticipated also by D1 in the paragraphs [0050]-[0054] and in figure 3A, wherein D1 discloses: A method of flowing a continuous phase in a microfluidic chip comprising at least one inlet microchannel, a droplet chamber and at least one output channel without disrupting the integrity of a population of droplets, the method comprising:
- providing the microfluidic chip according to any one of claims 1 to 11 (cf. D1, fig. 3A),
- flowing the population of droplets (22) from the at least one inlet microchannel (18) to the droplet chamber (21),
- flowing the continuous phase from the droplet chamber (21) to the at least one output channel (20), thereby maintaining the integrity of the population of droplets (22) stored in the droplet chamber (21) (cf. D1, [0052]).
Similar objection applies, mutatis mutandis, to claim 15.

1.6 Also D3 discloses all the technical features of claim 13 in the passages cited against the novelty of claim 1.

Therefore, also the subject-matter of claims 13 and 15 is not considered to be novel over D1 and/or D3 in the sense of Art. 33(2) PCT.

1.7 The passages of D1, D2 and/or D3 cited against the novelty of claim 1 also disclose inherently all the technical features of the dependent claims 2, 3, 6, 7, 12 and 14, as far as they can be understood, see clarity objections.

1.8 Furthermore, all the technical features of claims 4, 9, 10, 11, 16 and 17 are anticipated by D1 in the passages cited: claim 4: (cf. D1, [0050], "*the diameter of the outlet 20 is 250 µm*", wherein such small diameter is understood to be a "capillary trap") and (cf. D3, [0021], fig.12, wherein the capillary comprising the carrier (6) is considered to be the "capillary trap"); claim 9: (cf. D1, droplet generator: [0043] and figures 1A-G); claim 10: (cf. D1, [0042], wherein the

"carrier fluid" is considered to be the "continuous phase") and (cf. D3, [0021], carrier: (6)); claim 11 (cf. D1, fig. 1F); claim 16: (cf. D1, [0046], wherein the carrier fluid comprises a "surfactant") and claim 17: (cf. D1, [0036]).

Therefore, the subject-matter of the dependent claims 2, 3, 6-7, 9-12, 16 and 17 is not considered to be novel over D1 and/or D2 in the sense of Art. 33(2) PCT.

1.9 Furthermore the subject-matter of claim 5 is not considered to be inventive under Art. 33(3) PCT over D1 in view of the paragraph [0050], wherein a diameter of about 1 mm is anticipated. Also the further technical features of claim 8 do not seem to provide a surprising technical effect on the disclosed microfluidic chip. Therefore, claim 8 is also not considered to be inventive over the prior art under Art. 33(3) PCT.

2 **Re Item VIII**

Certain observations on the international application

The application does not meet the requirements of Article 6 PCT, because the subject-matter of claims 2, 3, 12, 13 and 15 is not clear.

2.1 The subject-matter of the dependent claims 2 and 3 does not seem to differ. It is therefore not clear which are the further limiting technical features of claim 3 over claim 2.

2.2 Claim 12 does not meet the requirements of Article 6 PCT because the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of the result to be achieved (cf. claim 12, "*without disrupting the integrity of a population of droplets in said droplet chamber"* and *"without disrupting the integrity of the population of droplets*"), which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result. Similar objection applies, mutatis mutandis, to the claim 14 (cf. "*wherein the system is configured to homogenize the continuous phase throrough droplet loading generation*") and to the claims 13 and 15 (last two lines of each one). For the scope of the search, said wordings have been understood in its broadest meaning as "suitable for".

2.3 Furthermore, in regards to claims 13 and 15, it appears that the functional features do not differ from each other. It is therefore not clear which are the differenciating functional features from the subject-matter which produce a different "technical effect" (cf. claim 13, "*thereby maintaining the integrity of the population of droplets stored in the droplet chamber*") and (cf. claim 15: "*thereby homogenizing the continuous phase during droplet loading or generation*").

2.4 It is not clear from the wording of claim 16 which is the category of the claim.

3 **Final remarks**

The following remarks will become relevant on entry into the examination phase:

3.1 The attention of the applicant is drawn to the fact that the application may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 19(2) PCT).

3.2 In order to facilitate the examination of the conformity of the amended application with the requirements of Article 19(2) PCT, the applicant should clearly identify the amendments made, irrespective of whether they concern amendments by addition, replacement or deletion, and indicate the passages of the application as filed on which these amendments are based.

3.3 The independent claims should, whenever appropriate be drafted in the two-part form (Rule 6 PCT).

3.4 To meet the requirements of Rule 5.1 PCT, the documents cited in the Search Opinion should be identified in the description and the relevant background art disclosed therein should be briefly discussed. The applicant should ensure that it is clear from the description which features of the subject-matter of independent claims are known from said documents.