

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

To:

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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.  
PCT/IT2015/000307

International filing date (day/month/year)  
14.12.2015

Priority date (day/month/year)  
12.12.2014

International Patent Classification (IPC) or both national classification and IPC  
INV. C12M1/00

Applicant  
LAVANGA VITO

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**

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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:

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**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**

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1. Statement

Novelty (N)	Yes: Claims	<u>1-14</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>4-14</u>
	No: Claims	<u>1-3</u>
Industrial applicability (IA)	Yes: Claims	<u>1-14</u>
	No: Claims	

2. Citations and explanations

see separate sheet

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**Box No. VIII Certain observations on the international application**

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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 and inventive step; citations and explanations supporting such statement**

Reference is made to the following documents:

- D1 WO 2008/070281 A2 (GEN ATOMICS [US]) 12 June 2008
- D2 WO 2010/045392 A1 (KAI BIOENERGY CORP [US]; LARACH MARIO C [US]) 22 April 2010

**1 Novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT)**

The subject matter of claims 1-14 is considered novel (Article 33(2) PCT) however, the present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of claims 1-3 does not involve an inventive step.

- 1.1 D1 is regarded as being the prior art closest to the subject-matter of claims 1-14, and discloses (claim 1 and fig. 1) a system for processing oil from algae which comprises: a conduit for growing algae cells, and an algae separator for removing the algae cells from remaining effluence; a device for lysing the algae cells and an oil separator for withdrawing the oil from remaining cell matter, with the remaining cell matter being a byproduct.

- 1.2 The subject-matter of claim 1 therefore differs in that device for lysing the algae cells is ultrasound and is therefore new (Article 33(2) PCT).

The problem to be solved by the present application is therefore the provision of an alternative means of lysing the algae cells and the solution proposed is the use of ultrasound.

The use of ultrasound for lysing algae and releasing oil does not involve inventive activity since it is known to the skilled person to use ultrasound to lyse algae. D2 discloses a cavitation (ultrasound) device for rupturing a microalgae cell wall (claim 1).

The use of ultrasound is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

The subject matter of claim 1 therefore lacks inventive step (Article 33(3) PCT).

- 1.3 Dependent claims 2 and 3 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 in respect of inventive step.

Said claims relate to slight modifications of the method of claim 1 which come within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen. Consequently, the subject-matter of claims 2 and 3 also lacks an inventive step (Article 33(3) PCT).

- 1.4 The subject-matter of claim 4 therefore differs from D1 at least in the following features, the bioreactor of the present application has two volumes, one for cell growth and one for cell extraction and are connected by a pipe with a cavitation means to transfer algae to the second volume with a means for extracting a protein component, an oleic component and a neutral phase. The subject matter of claim 4 is therefore new (Article 33(2) PCT).

The problem to be solved in claim 4 may be regarded as the provision of a bioreactor for growing microalgae and processing the microalgae obtained.

The solution proposed is a bioreactor having two volumes, one for growing the microalgae and one for processing the microalgae obtained and having a cavitation means linking the two volumes for lysing the microalgae cells and a means for collecting an oleic component, a protein component and algae biomass.

The solution to this problem proposed in claim 4 of the present application is considered as involving an inventive step for the following reasons:

Although D2 discloses a cavitation device for rupturing a microalgae cell wall (claim 1), neither D1 nor D2 hint to a bioreactor having all the features of claim 4. The subject matter of claim 4 would not be obvious for a skilled person to reproduce, and therefore involves inventive activity (Article 33(3) PCT).

- 1.5 Claims 5-14 are dependent on claim 4 and as such also meet the requirements of novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT).

**Re Item VIII**

**Certain observations on the international application**

**1 Clarity (Article 6 PCT)**

- 1.1 The application does not meet the requirements of Article 6 PCT because claim 4 is not clear.

Claim 4 lacks essential technical features (Article 6 PCT). The "means fitted to separately collect said oleic, protein and neutral phases" is not sufficiently disclosed and it is not clear to the skilled person how or what feature is necessary to obtain the desired result of separated phases. The introduction in claim 4 of the subject matter of claim 11, if properly formulated should overcome this objection.

It is also clear from Fig. 1 that feature that the middle component extracted for the lysed cell mixture is recycled to the first volume is essential to the definition of the invention.

Since independent claim 4 does not contain these features it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

- 1.2 Secondly, because the scope of protection of a claim relating to a device is generally considered greater than the scope of protection offered by a method claim, claims relating to devices are generally placed before claims relating to a method.

If the applicant wishes to maintain a method claim then he should make sure that the method claim makes reference to the use of the device of previous claims.

Laura Jones