

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference TOTAL-210-PCT	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/EP2018/070315	International filing date (<i>day/month/year</i>) 26 July 2018 (26-07-2018)	(Earliest) Priority Date (<i>day/month/year</i>) 7 August 2017 (07-08-2017)
Applicant TOTAL RAFFINAGE CHIMIE		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out 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))

b. This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. **Certain claims were found unsearchable** (See Box No. II)

3. **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- the text is approved as submitted by the applicant
 the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- the text is approved as submitted by the applicant
 the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1
 as suggested by the applicant
 as selected by this Authority, because the applicant failed to suggest a figure
 as selected by this Authority, because this figure better characterizes the invention
- b. none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/070315

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12P5/02
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
C12P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, COMPENDEX, FSTA, BIOSIS, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>CUELLAR ET AL: "Recent advances in the microbial production and recovery of apolar molecules", CURRENT OPINION IN BIOTECHNOLOGY, vol. 33, 2015, pages 39-45, XP002774110, * See page 40 (Table 1/recovery from the gas phase), page 41 (right column/farnesene), and page 42 (recovery from fermentation broth) *</p> <p style="text-align: center;">----- -/--</p>	1-18

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

5 September 2018

Date of mailing of the international search report

19/09/2018

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Korsner, Sven-Erik

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/070315

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	HEERES ET AL: "Microbial advanced biofuels production: overcoming emulsification challenges for large-scale operation", TRENDS IN BIOTECHNOLOGY, vol. 32, 2014, pages 221-229, XP028837784, * See page 221 (Abstract) and pages 226-227 (Concluding remarks) *	1-18
A	N.N.: "Integrated Biorefinery (Project summary)", Amyris, Inc. Final report - Public version, 2013, pages Cover + 1-111, XP002774111, Retrieved from the Internet: URL: https://www.osti.gov/scitech/servlets/purl/1122942/ [retrieved on 2017-09-26] * See pages 11, 30, 37-38, 68 (Figure B.26), and 72 for product recovery; in total 112 pages *	1-18
A	HEERES ET AL: "Gas bubble induced oil recovery from emulsions stabilised by yeast components", CHEMICAL ENGINEERING SCIENCE, vol. 145, 2016, pages 31-44, XP029465513, * See pages 31-32 (Abstract and Introduction) *	1-18
A	CHENG ET AL: "Downstream processing of biotechnological produced succinic acid", APPLIED MICROBIOLOGY AND BIOTECHNOLOGY, vol. 95, 2012, pages 841-850, XP035090900, * See page 842 (left column/the paragraph above Direct crystallization) *	1-18
A	BENJAMIN ET AL: "Developing commercial production of semi-synthetic artemisinin, and of beta-farnesene, an isoprenoid produced by fermentation of Brazilian sugar", JOURNAL OF THE BRAZILIAN CHEMICAL SOCIETY, vol. 27, 2016, pages 1339-1345, XP002773968, * See page 1342 (section 4) *	1-18
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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/070315

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	LEE ET AL: "Direct conversion of CO ₂ to alpha-farnesene using metabolically engineered <i>Synechococcus elongatus</i> PCC 7942", JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, vol. 65, 25 October 2017 (2017-10-25), pages 10424-10428, XP002784428, * See page 10424 (Abstract) * -----	1-18