



- (51) International Patent Classification:  
C12P 7/64 (2006.01)
- (21) International Application Number:  
PCT/NZ2012/000161
- (22) International Filing Date:  
7 September 2012 (07.09.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
61/532,412 8 September 2011 (08.09.2011) US
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,

DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

- Published:
- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

- (88) Date of publication of the international search report:  
29 August 2013

(54) Title: A FERMENTATION PROCESS

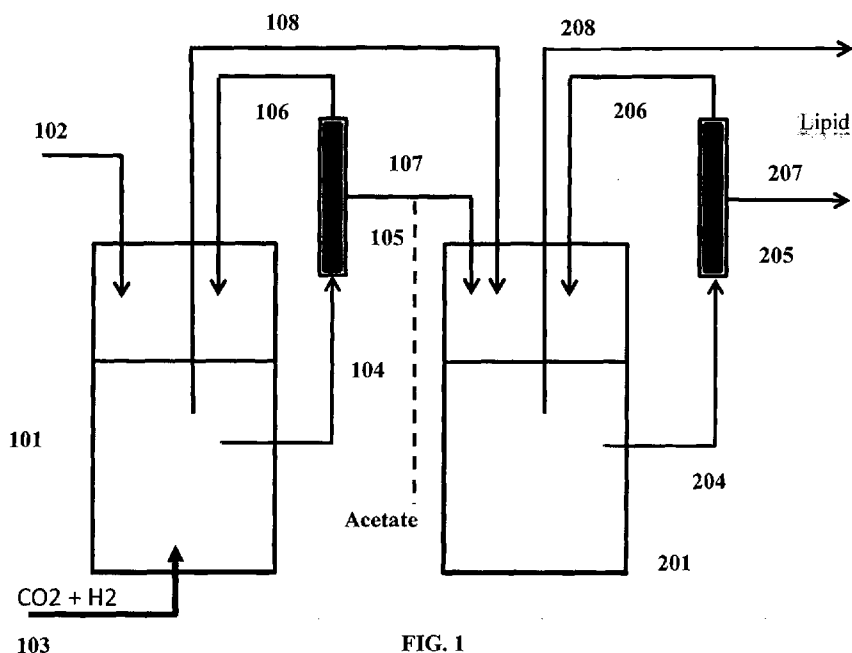


FIG. 1

(57) Abstract: Methods and systems for the production of one or more lipid products from a gaseous substrate using a two stage fermentation process. The method providing a gaseous substrate comprising CO<sub>2</sub> and H<sub>2</sub> to a first bioreactor containing a culture or one or more microorganisms, and fermenting the substrate to produce acetate. The acetate from the first bioreactor is then provided to a second bioreactor, where it is used as a substrate for fermentation to lipids by one or more yeasts.



**A. CLASSIFICATION OF SUBJECT MATTER****C12P 7/64(2006.01)i**

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 7/64; C12M 1/00; C12P 7/08; C12M 1/36; C12P 1/00; C12P 7/54; C12P 7/04; C12P 5/00; C12P 7/02; C12P 7/06

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: CO2, H2, acid, acetate, lipid, ferment, bioreactor, gas stream, carbon capture, etc.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010-0159539 A1 (ASCON, MIGUEL et al.) 24 JUNE 2010 See abstract; claims 1, 2, 16 and 31; pages 3 and 4.	1-3,5-8,14,16-24
A	US 6340581 B1 (GADDY, JAMES L.) 22 January 2002 See abstract; claims 1, 2 and 12; column 4, 14.	1-3,5-8,14,16-24
A	WO 2008-151149 A2 (SOLAZYME, INC.) 11 December 2008 See abstract; claims 1, 6, 7, 14, 19 and 20.	1-3,5-8,14,16-24
A	US 2007-0281349 A1 (JACZYNSKI, JACEK) 06 December 2007 See abstract; claims 1 and 19.	1-3,5-8,14,16-24
A	US 2010-0323417 A1 (SIMPSON, SEAN DENNIS et al.) 23 December 2010 See abstract; claims 1, 4, 5, 9, 10 and 11-13.	1-3,5-8,14,16-24
A	US 7972824 B2 (SIMPSON, SEAN DENNIS et al.) 05 July 2011 See abstract; claims 1, 3, 4, 5, 7 and 8.	1-3,5-8,14,16-24



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 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

20 June 2013 (20.06.2013)

Date of mailing of the international search report

**21 June 2013 (21.06.2013)**

Name and mailing address of the ISA/KR

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**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: 11-13,15  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
Claims 11-13 and 15 are unclear since they are referring to the multiple dependent claims which do not comply with PCT Rule 6.4(a).
  
3.  Claims Nos.: 4,9,10  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
  
  
  
  
  
  
  
  
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

**PCT/NZ2012/000161**

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US 2007-0281349 A1	06.12.2007	None	

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/NZ2012/000161**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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