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*[Continued on next page]*

(54) Title: CONTROL OF GROWTH-INDUCTION-PRODUCTION PHASES

(57) Abstract: The present invention provides various combinations of genetic modifications to a transformed host cell that provide increase conversion of carbon to a chemical product. The present invention also provides methods of fermentation and methods of making various chemical products.

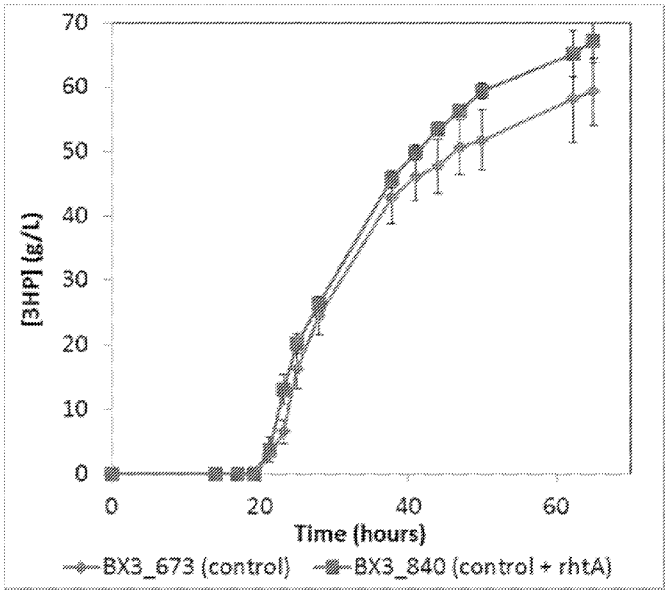



FIG. 7

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OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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.

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**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))*

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**INTERNATIONAL SEARCH REPORT**

International application No.
**PCT/US2014/030085**

**A. CLASSIFICATION OF SUBJECT MATTER**

**C12N 15/63(2006.01)i, C12N 15/52(2006.01)i, C12P 7/00(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)
C12N 15/63; C07C 29/86; C12P 7/16; C12P 7/18; C12P 1/00; C12P 7/56; C12P 13/04; C12N 1/21; C12P 7/54; C12N 15/74; C12N 15/52; C12P 7/00

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) & Keywords:bioproduction, biosynthesis, multi-phase production, temperature-sensitive enzyme, promoter

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | WO 2012-129450 A1 (OPX BIOTECHNOLOGIES, INC.) 27 September 2012<br>See claims 1-2, 6 and 44. | 1-4,27,31 |
| A | | 25-26,33 |
| X | US 2011-0159558 A1 (GRADY, MICHAEL CHARLES et al.) 30 June 2011<br>See claims 19-20. | 1 |
| A | | 2-4,25-27,31,33 |
| A | WO 2011-038364 A1 (OPX BIOTECHNOLOGIES, INC. et al.) 31 March 2011<br>See claims 1 and 15. | 1-4,25-27,31,33 |
| A | US 2012-0129231 A1 (WANG, QINGZHAO et al.) 24 May 2012<br>See claims 12 and 20. | 1-4,25-27,31,33 |
| A | US 2009-0148914 A1 (CAUSEY, THOMAS B. et al.) 11 June 2009<br>See claim 1. | 1-4,25-27,31,33 |

☐ 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 | Date of mailing of the international search report |
|---|---|
| 26 August 2014 (26.08.2014) | **27 August 2014 (27.08.2014)** |

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**INTERNATIONAL SEARCH REPORT**

International application No.
**PCT/US2014/030085**

**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.:
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:

3. ☒ Claims Nos.: 5-24,28-30,32,34-41
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 addtional 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 fees, this Authority did not invite payment of any additional fees.

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/US2014/030085**

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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| WO 2012-129450 A1 | 27/09/2012 | CN 103562398 A | 05/02/2014 |
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| | | WO 2004-044210 A3 | 07/05/2009 |