Title: ENGINEERED MICROORGANISMS FOR INCREASING PRODUCT YIELD IN BIOTRANSFORMATIONS, RELATED METHODS AND SYSTEMS

Abstract: Recombinant microorganisms engineered to increase product yield in a biotransformation are shown. The microorganisms are engineered to increase the amount of NAD(P)H available for a NAD(P)H-requiring oxidoreductase involved in the biotransformation. Also methods and systems using such recombinant microorganisms are described.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/17013

A. CLASSIFICATION OF SUBJECT MATTER

IPC: C12N 9/02(2006.01), 1/20(2006.01), 15/00(2006.01); C12Q 1/00(2006.01), 1/34(2006.01), 1/68(2006.01); C12P 21/06(2006.01), 21/04(2006.01); A61K 38/44(2006.01); C07H 21/04(2006.01); C07K 1/00(2006.01), 16/00(2006.01)

USPC: 435/189, 4, 6, 18, 69.1, 71.1, 252.3, 320.1, 1, 536/23.2, 2, 530/350, 387.9, 424/94.4

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)
U.S.: 435/189, 4, 6, 18, 69.1, 71.1, 252.3, 320.1, 1, 536/23.2, 2, 530/350, 387.9, 424/94.4

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>

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 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

Inter 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

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

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
18 June 2008 (18.06.2008)

Date of mailing of the international search report
23 JUL 2008

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (571) 273-3201

Authorized officer
Nashaat Nashed
Telephone No. 571-272-1600

Form PCT/ISA/210 (second sheet) (April 2007)
INTERNATIONAL SEARCH REPORT

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.: 10-17, 20 and 29 because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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 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.