Title: HIGH-THROUGHPUT ASSEMBLY OF GENETIC ELEMENTS

**Abstract:** Disclosed is a method of generating a set of sequence-verified nucleic acid elements for the combinatorial construction of genetic elements. The method includes: providing a plurality of nucleic acid parts; assembling nucleic acid parts to form a one or more nucleic acid elements, wherein the nucleic acid elements include at least two sequences selected from the plurality of parts; and determining the sequence of the nucleic acid elements. Further disclosed is a pool of higher-order nucleic acid constructs or amplification products thereof, comprising one or more nucleic acid elements as well as kits including a pool of sequence-verified nucleic acid elements of claims and/or a pool of higher-order nucleic acid constructs; and a plurality of primers for retrieving one or more sequence-verified nucleic acid elements and/or higher-order nucleic acid constructs.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C12N 15/10 (2015.01)
CPC - C12N 15/1031 (2015.1)

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)

IPC(8) - C12N 15/01, 15/10 ; C40B 40/06 ; G06F 19/18, 19/28 (2015.01)
CPC - C12N 15/01, 15/10, 15/1027, 15/1031, 15/1065, 15/1093 ; C12Q 2563/185 ; C40B 40/06 ; G06F 19/18, 19/28 (2015.1)

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

CPC - C12N 15/01, 15/10, 15/1027, 15/1031, 15/1065, 15/1093 ; C12Q 2563/185 ; C40B 40/06 ; G06F 19/18, 19/28 (2015.1) (keyword delimited); USPC - 506/2, 16 ; 536/23.1

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

Orbit, Google Patents, Google Scholar. Search terms used: nucleic acid, oligonucleotide, polynucleotide, DNA, ordered, assembly, barcode, primer, hash, algorithm, restriction, sticky ends

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>
<tbody>
<tr>
<td>Y</td>
<td>US 2014/01211 116 A1 (COUNSYL INC) 01 May 2014 (01.05.2014) entire document</td>
<td>132, 133</td>
</tr>
<tr>
<td>A</td>
<td>WO 2008/054543 A2 (C0DON DEVICES INC) 08 May 2008 (08.05.2008) entire document</td>
<td>1-3, 88-90, 132, 133</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C. See patent family annex.

Date of the actual completion of the international search
17 November 2015

Date of mailing of the international search report
29 Dec 2015

Name and mailing address of the ISA/Authorized officer
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-8300
PCT Helpdesk: 571-272-4300
PCT O SP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)
INTERNATIONAL SEARCH REPORT

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.: 4-87, 91-131, 134-138
   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 additional fees, this Authority did not invite payment of 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.

Form PCT/ISA/2 10 (continuation of first sheet (2)) (January 2015)