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EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,  
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TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
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(54) **Title:** METHODS AND COMPOSITIONS FOR THE ANALYSIS OF BIOLOGICAL MOLECULES

(57) **Abstract:** Provided herein are compositions and methods for analysis of nucleic acids, including, methods and compositions for genotyping, haplotyping, sequencing and performing other genetic and epigenetic analyses on nucleic acids, for example. In some embodiments, methods and compositions suitable for whole-genome sequencing on single molecules of nucleic acid are provided. In some embodiments, analysis of single molecules of nucleic acid are performed in conjunction with nanopores and/or nanopore devices.

**A. CLASSIFICATION OF SUBJECT MATTER***C12Q 1/68(2006.01)i, C12N 15/11(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)

IPC: C12Q 1/68, C12N 15/11

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 since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKOMPASS(KIPO Internal)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages    | Relevant to claim No. |
|-----------|---|-----------------------|
| A         | US 2005-0130213 A1(Tom Morrison) 16 June 2005<br>see claims 1-7, 14, figs. 4A, 4B, 4C | 1-4                   |
| A         | US 5759773 A(Sanjay Tyagi et al.) 02 June 1998<br>see claims 1-6                      | 1-4                   |
| A         | US 6297006 B1(Radoje T. Drmanac et al.) 02 October 2001<br>see claims 1-3             | 1-4                   |
| A         | US 6506594 B1(Francis Barany et al.) 14 January 2003<br>see claims 1-7, figs. 3-9     | 1-4                   |
| A         | US 5750341 A(Stephen C. Macevicz) 12 May 1998<br>see abstract                         | 1-4                   |
| A         | US 6013456 A(Hashem Akhavan-Tafti) 11 January 2000<br>see claims 1-5                  | 1-4                   |

 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

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

Date of the actual completion of the international search

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

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| Patent document cited in search report | Publication date | Patent family member(s)   | Publication date   |
|--|------------------|---|--|
| US 06506594 B1                         | 14.01.2003       | US 2003-0175750 A1  | 18.09.2003   |
| US 05750341 A                          | 12.05.1998       | AU 718937 B2<br>AU 1996-55490 B2<br>CA 2218017 C<br>JP 2007-282639 A<br>JP 11-503908 A<br>JP 2008-086328 A<br>US 05750341 A<br>US 05969119 A<br>US 05969119 A<br>US 06306597 B1<br>WO 1996-033205 A1                            | 04.05.2000<br>16.04.1996<br>02.12.2003<br>01.11.2007<br>06.04.1999<br>17.04.2008<br>12.05.1998<br>19.10.1999<br>19.10.1999<br>23.10.2001<br>24.10.1996               |
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| US 05759773 A                          | 02.06.1998       | EP 0688366 A1<br>EP 0688366 A4<br>EP 0688366 B1<br>JP 03-778925 B2<br>JP 08-505770 A<br>US 05759773 A<br>WO 1994-016108 A1  | 27.12.1995<br>21.04.1999<br>22.05.2002<br>10.03.2006<br>25.06.1996<br>02.06.1998<br>21.07.1994   |
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| US 2005-0130213 A1                     | 16.06.2005       | None  |  |

**INTERNATIONAL SEARCH REPORT**International application No.  
**PCT/US2009/031325****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.: 7,10,11,13,15,17,19,21,23,26,28,30,31  
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:  
  
The claims are unclear because of referring to unsearchable claims
  
3.  Claims Nos.: 5,6,8,9,12,14,16,18,20,22,24,25,27,29  
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.