

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2015/066942

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12N15/11
ADD.

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

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

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

EP0-Internal, BIOSIS, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/273232 A1 (BROAD INST INC [US]; MASSACHUSETTS INST TECHNOLOGY [US]; HARVARD COLLE) 18 September 2014 (2014-09-18) paragraphs [0033], [0039], [0077], [0159]; figure 6; example 1; sequences 39, 150	1-6, 12-14,16
X	WO 2014/144592 A2 (GEN HOSPITAL CORP [US]) 18 September 2014 (2014-09-18) page 25, line 26 - page 26, line 32; sequences 8, 2405-2412 ----- -/--	1-10, 12-14, 16, 18-20,22



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

16 August 2016

Date of mailing of the international search report

25/08/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

Spindler, Mark-Peter

International application No
PCT/US2015/066942

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	M. JINEK ET AL: "A Programmable Dual-RNA-Guided DNA Endonuclease in Adaptive Bacterial Immunity", SCIENCE, vol. 337, no. 6096, 17 August 2012 (2012-08-17), pages 816-821, XP055229606, US ISSN: 0036-8075, DOI: 10.1126/science.1225829 cited in the application the whole document	1-9
X	-& M. JINEK ET AL: "A Programmable Dual-RNA-Guided DNA Endonuclease in Adaptive Bacterial Immunity (Supplementary Material)", SCIENCE, vol. 337, no. 6096, 28 June 2012 (2012-06-28), XP055067747, US ISSN: 0036-8075, DOI: 10.1126/science.1225829 the whole document	1-9
X	----- WO 2014/065596 A1 (TOOLGEN INC [KR]) 1 May 2014 (2014-05-01) figure 10; example 2; table 2	1-6
X	----- WO 2014/124226 A1 (UNIV ROCKEFELLER [US]) 14 August 2014 (2014-08-14) page 15; sequence 32	1-6
X	----- REGINA CENCIC ET AL: "Protospacer Adjacent Motif (PAM)-Distal Sequences Engage CRISPR Cas9 DNA Target Cleavage", PLOS ONE, vol. 9, no. 10, 2 October 2014 (2014-10-02), page e109213, XP055175713, DOI: 10.1371/journal.pone.0109213 the whole document	7-9
X,P	----- MEGHDAD RAHDAR ET AL: "Synthetic CRISPR RNA-Cas9-guided genome editing in human cells", PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, 16 November 2015 (2015-11-16), XP055264777, US ISSN: 0027-8424, DOI: 10.1073/pnas.1520883112 the whole document	7-10, 18-20,22
A,P	----- the whole document	11-17, 21,23

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2015/066942

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	AYAL HENDEL ET AL: "Chemically modified guide RNAs enhance CRISPR-Cas genome editing in human primary cells", NATURE BIOTECHNOLOGY, vol. 33, no. 9, 29 June 2015 (2015-06-29), pages 985-989, XP055233915, US	12-14, 18-20,22
A,P	ISSN: 1087-0156, DOI: 10.1038/nbt.3290 the whole document	15-17, 21,23
E	----- WO 2016/080097 A1 (NAT UNIV CORP TOKYO MED & DENT [JP]; FASMAC CO LTD [JP]) 26 May 2016 (2016-05-26) tables 1, 2; sequences 5, 7-9	1-3,7-9
E	----- WO 2016/089433 A1 (AGILENT TECHNOLOGIES INC [US]) 9 June 2016 (2016-06-09) the whole document -----	12-14, 16, 18-20,22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/066942

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.:
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:

see additional sheet

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 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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6

tracrRNA comprising a length-modified form of SEQ ID NO: 18 displaying activity in a CRISPR-Cas system

2. claims: 7-11

crRNA comprising a length-modified form of formula (I) [as defined in claim 7] displaying activity in a CRISPR-Cas system

3. claims: 12-23

chemically modified components of a dual guide RNA for the CRISPR-Cas system; tracrRNA comprising a chemically-modified form of one of SEQ ID NO: 2, 18, 30-33 and 36-39; crRNA comprising a chemically-modified form of formula (I) [as defined in claim 18]

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2015/066942

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INTERNATIONAL SEARCH REPORT

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