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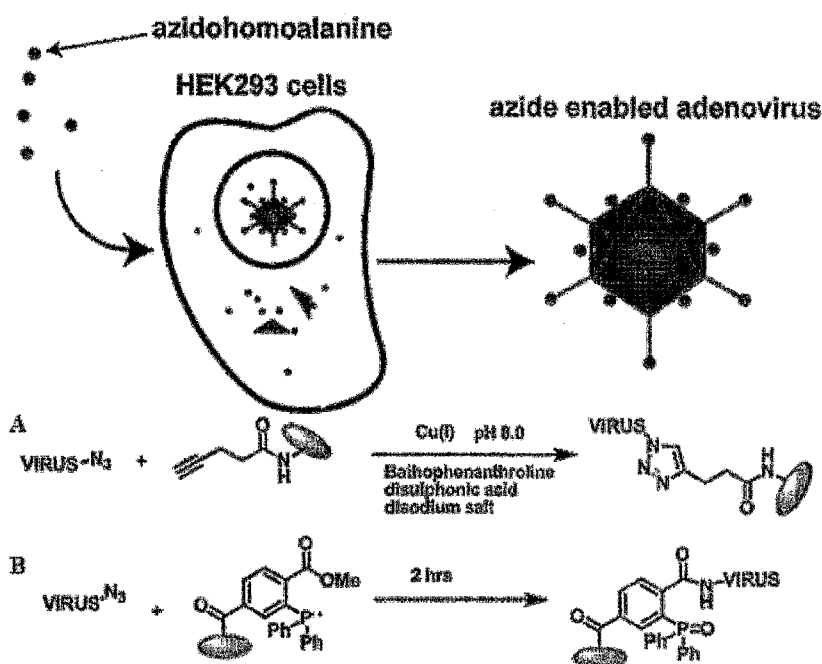
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[Continued on next page]

(54) Title: VIRUSES MODIFIED WITH UNNATURAL MOIETIES AND METHODS OF USE THEREOF

Figure 1



(57) Abstract: The invention provides compositions and methods for making and using modified viruses, including infectious viruses, having an external surface linked to at least one heterologous unnatural moiety that is exemplified by unnatural amino acid and unnatural saccharide. The unnatural moiety that is linked to the invention's modified viruses is optionally further linked to a molecule of interest (such as probe, cytotoxin, therapeutic molecule, antibody, affibody, epitope, etc). The invention's compositions and methods find use in, for example, diagnostic applications and therapeutic applications such as gene therapy, oncolytic therapy, and/or vaccine therapy.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *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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A. CLASSIFICATION OF SUBJECT MATTER

A61K 31/70(2006.01)i, A61K 31/715(2006.01)i, A61K 31/714(2006.01)i, A61K 39/12(2006.01)i, A61K 47/48(2006.01)i, A61K 47/30(2006.01)i, A61P 35/00(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)

A61K 31/70; C12P 21/00; C12N 15/18; A61K 38/00; C07K 14/52; C12N 9/00; C12P 21/06

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), Google & PubMed

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BANERJEE, P. S. et al., 'Chemoselective attachment of small molecule effector functionality to human adenoviruses facilitates gene delivery to cancer cells', J. Am. Chem. Soc., 6 October 2010, Vol. 132, No. 39, pp. 13615-13617 See abstract; figure 1; supplementary scheme 1, 2; p. 13616, right column.	1-16
X	US 2008-0125347 A1 (GRABSTEIN, K. H. et al.) 29 May 2008 See claims 1, 3; paragraphs [0156], [0178], [0179], [0301].	1,2,5-7,9,10
X	US 2010-0273978 A1 (MCCRAITH, S.) 28 October 2010 See claim 1; paragraphs [0013], [0136], [0145], [0249]; abstract.	1,2,5-7,9,10
X	US 2008-0044854 A1 (WANG, P. et al.) 21 February 2008 See claims 13, 30; paragraphs [0032], [0192], [0336].	1,2,5-7,9
PX	BANERJEE, P. S. et al. 'Chemoselective Modification of Viral Proteins Bearing Metabolically Introduced "Clickable" Amino Acids and Sugars', Methods in Molecular Biology, 2011, Vol. 751, pp. 55-66 See pp. 59, 60, 63; abstract.	1-16



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

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"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

15 NOVEMBER 2012 (15.11.2012)

Date of mailing of the international search report

16 NOVEMBER 2012 (16.11.2012)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/035212

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of :

a. a sequence listing filed or furnished

☐

on paper

☒

in electronic form

b. time of filing or furnishing

☐

contained in the international application as filed

☒

filed together with the international application in electronic form

☐

furnished subsequently to this Authority for the purposes of search

2. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/035212**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.: 17-22
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 17-22 pertain to methods for treatment of the human body by therapy, as well as diagnostic methods, and thus relate to a subject matter which this International Searching Authority is not required to search under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulations under the PCT.
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:

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/035212

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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