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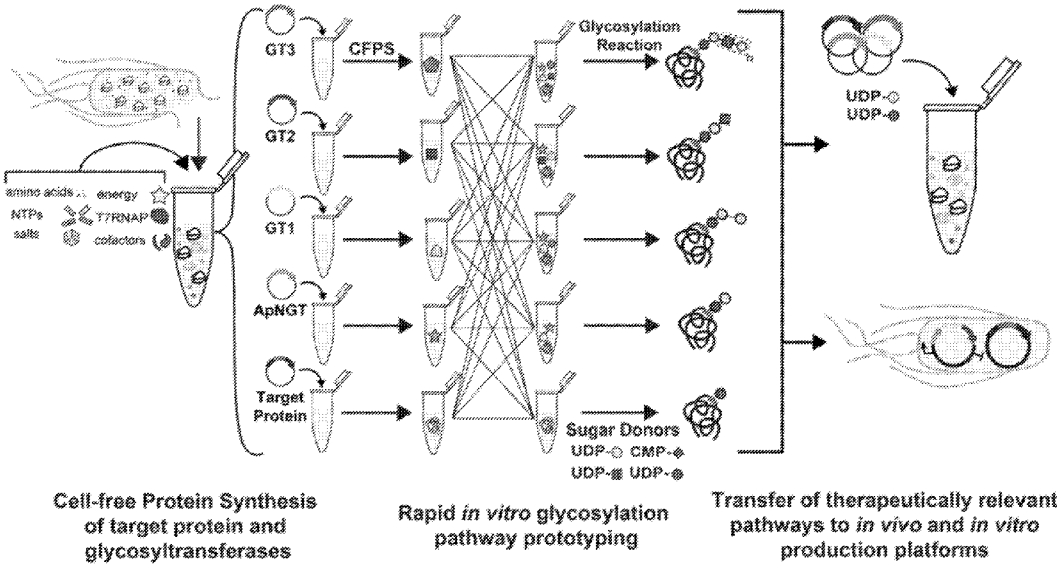
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(54) Title: PLATFORM FOR PRODUCING GLYCOPROTEINS, IDENTIFYING GLYCOSYLATION PATHWAYS

Figure 1



(57) Abstract: Disclosed are components, systems, and methods for glycoprotein protein synthesis *in vitro* and *in vivo*. In particular, the disclosed components, systems, and methods relate to modular platforms for producing glycoproteins. The components, systems, and methods disclosed herein may be used in synthesizing glycoproteins and recombinant glycoproteins in cell-free protein synthesis (CFPS) and in modified cells.

[Continued on next page]

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

Published:

— *with international search report (Art. 21(3))*
— *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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15 October 2020 (15.10.2020)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 2020/015242

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.: 21
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:
Claim 21 are not examined for the search as it refers to claim 20, which does not exist.

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 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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2020/015242

A. CLASSIFICATION OF SUBJECT MATTER

C12N 15/56 *(2006.01)*
C12N 15/57 *(2006.01)*
C12N 9/48 *(2006/01)*
A61K 38/14 *(2006.01)*

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 15/00-C12N 15/90, C12N 9/48, A61K 38/14

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)

EAPATIS, ESPACENET, PatSearch (RUPTO internal), Information Retrieval System of FIPS, USPTO, PATENTSCOPE, Google, E-Library, PubMed

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KIGHTLINGER Weston et al. Design of Protein Glycosylation Sites By Cell-Free Protein Synthesis and Mass Spectrometry of Self-Assembled Monolayers. In: Synthetic Biology Conference, SEED 2017: Engineering, Evolution, and Design, Vancouver, Canada 20-23 June 2017, AIChE, 2017, pp. 10-11, ISBN: 978-1-5108-5673-8, [online] [retrieved on 06.08.2020]. Retrieved from < https://www.aiche.org/sbe/conferences/synthetic-biology-engineering-evolution-design-seed/2017/proceeding/paper/design-protein-glycosylation-sites-cell-free-protein-synthesis-and-mass-spectrometry-self-assembled>	1-13, 14 (the second)-19, 22-26
X, D	JAROENTOMEECHAI Thapakorn et al. Single-pot glycoprotein biosynthesis using a cell-free transcription-translation system enriched with glycosylation machinery.	14 (the first)
A, D	Nat Commun, 2018 Jul 12, 9(1), Article number: 2686, DOI: 10.1038/s41467-018-05110-x, paragraph 2	1-13, 14 (the second)-19, 22-26
A, D	WO 2017/117539 A1 (NORTHWESTERN UNIVERSITY) 06.07.2017, claims	1-19, 22-26

☐ 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

"D" document cited by the applicant in the international application

"E" earlier document 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	Date of mailing of the international search report
10 August 2020 (10.08.2020)	10 September 2020 (10.09.2020)
Name and mailing address of the ISA/RU: Federal Institute of Industrial Property, Berezhkovskaya nab., 30-1, Moscow, G-59, GSP-3, Russia, 125993 Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37	Authorized officer M. Gnatyuk Telephone No. +7 (495) 531-64-81