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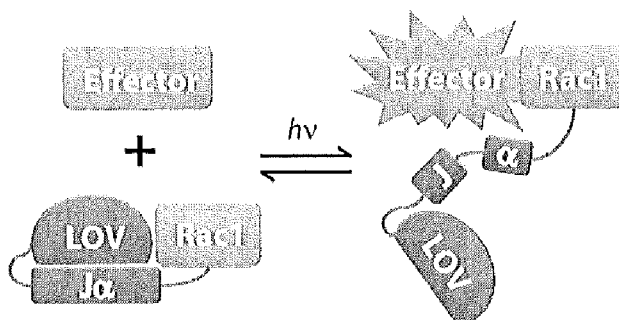
Published:

- 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))
- with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:

16 June 2011

(54) Title: GENETICALLY ENCODED PHOTOMANIPULATION OF PROTEIN AND PEPTIDE ACTIVITY

FIG. 1.**a**

(57) Abstract: The present invention relates to fusion proteins comprising protein light switches and methods of photomanipulating the activity of the proteins. The invention further relates to polynucleotides and vectors encoding the fusion proteins, cells comprising the fusion proteins, and methods of using the fusion proteins to study protein function and analyze subcellular activity, as well as diagnostic and therapeutic methods.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/040747**A. CLASSIFICATION OF SUBJECT MATTER***C07K 19/00(2006.01)i, C12N 15/63(2006.01)i, C12N 15/62(2006.01)i, C40B 40/10(2006.01)i, G01N 33/68(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)

C07K 19/00; C07H 21/04; C12N 15/01; C12N 9/12

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) & Keywords: fusion protein, light switch, illumination, activate, LOV domain

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Monika Schmoll et al., 'Envoy, a PAS/LOV domain protein of Hypocrea jecorina (Anamorph Trichoderma reesei), modulates cellulase gene transcription in response to light', EUKARYOTIC CELL, Vol. 4(12) pp. 1998-2007 (December 2005) See Abstract, Fig 2, 3, Page 2005-2006	1-3
X	US 2004-0038400 A1 (ALLAN, C. FROEHLICH et al.) 26 February 2004 See Abstract, Paragraphs [0004], [0027]-[0035], Claims 1-4	1-3
A	US 2005-0074846 A1 (KEVIN, H. GARDNER et al.) 07 April 2005 See Abstract, Paragraphs [0004], [0009]-[0014]	1-3

☐ 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

"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

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Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2010/040747

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.: 12, 13, 15, 18, 20-22, 27, 28, 37-47, 49, 51, 54, 55, 57, 58
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:

Because claims 12, 13, 15, 18, 20-22, 27, 28, 37-47, 49, 51, 54, 55, 57 or 58 directly or indirectly refer to claims 11, 14, 17, 19, 26, 36, 48, 50, 53 or 56 which are not drafted in accordance with the second and/or third sentence of Rule 6.4(a), no opinion could be formulated as to novelty or inventive step of these claims.

3. ☒ Claims Nos.: 4-11, 14, 16, 17, 19, 23-26, 29-36, 48, 50, 52, 53, 56
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:

Claims 1-58 (Group 1), Claims 59-72 (Group 2), Claims 73-77 (Group 3), Claims 78-83 (Group 4), Claims 84-93 (Group 5), Claims 94-102 (Group 6).

The only common technical feature between Groups 1-6 comprises a fusion protein comprising a protein of interest fused to a protein light switch, wherein illumination of the fusion protein activates or inactivates the protein of interest. However, this feature lacks novelty and/or inventive step with respect to a document of EUKARYOTIC CELL, Vol. 4(12) pp. 1998-2007 on December 2005 cited in this ISR.

Thus, there is no technical relationship left over the prior art among the claimed inventions leaving the claims without a single general inventive concept. Hence there is lack of unity "a posteriori" (PCT Rules 13.1 and 13.2).

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.: 1-58

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/US2010/040747

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004-0038400 A1	26.02.2004	US 6733996 B2	11.05.2004
US 2005-0074846 A1	07.04.2005	WO 2005-033662 A2	14.04.2005
		WO 2005-033662 A3	12.01.2006
		WO 2005-033662 A3	14.04.2005