(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 October 2007 (18.10.2007)

PCT

(10) International Publication Number
WO 2007/117453 A3

(51) International Patent Classification:
A61K 36/06 (2006.01) *C12N 15/74* (2006.01)

(21) International Application Number:
PCT/US2007/008292

(22) International Filing Date: 2 April 2007 (02.04.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/789,751 5 April 2006 (05.04.2006) US
60/819,856 10 July 2006 (10.07.2006) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
27 November 2008

(54) Title: RADIOSYNTHESIS AS AN ALTERNATIVE ENERGY UTILIZATION PROCESS IN MELANIZED ORGANISMS AND USES THEREOF

(57) Abstract: This present invention provides methods of enhancing the growth of a microorganism or plant by increasing its melanin content and exposing it to radiation, and methods of using melanized microorganisms to contain or exclude radiation.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/08292

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **A61K 36/06(2006.01);C12N 15/74(2006.01)**

USPC: 424/195.15,435/173.8
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)
U.S. : 424/195.15, 435/173.8

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)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- A	US 2005/0230347 A1 (GALLAS et al) 20 October 2005 (20.10.2005), whole document, especially figures 2-3, paragraphs 5 and 57, and claim 1.	30,31 --- 29,33
X --- A	WANG, Y. Applied an Environmental Microbiology, October 1994, Vol.60, No.10, pages 3864-3866, whole document.	1,5,7,14-18,20,21,27,28,30-32 --- 1-33
X --- A	DOSS, R.P. et al "Melanin in the extracellular matrix of germlings of Botrytis cinerea" Phytochemistry, July 2003, Vol. 63, No. 6, pages 687-691, whole document especially § 3.3, page 690.	32,33 --- 1-33

☒ 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 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
11 July 2008 (11.07.2008)	25 SEP 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Aaron Kosar Telephone No. (571) 272-1600

Form PCT/ISA/210 (second sheet) (April 2007)

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	TAKEUCHI, S. et al. "Melanin acts as a potent UVB photosensitizer to cause an atypical mode of cell death in murine skin." PNAS 19 October 2004, 101(42), pages 15076-15081, whole document, especially Abstract, lines 7-8, 22-27 and paragraphs 1-2, page 15076.	1,19,21,30-33
A	KARPENKO,Y.V. "Comparative responses of microscopic fungi to ionizing radiation and light." Folia microbiologica, 2006, Vol. 51, No. 1, pages 45-49, CAS ABSTRACT.	1-33
A	BLAZHEEVSKAIA, I.V. "Growth characteristics of microscopic fungi capable of growing actively under the conditions of the 4th unit of the Chernobyl Nuclear Power Plant" Microbiol. Z. May-June 2003, Vol. 65, No. 3, pages 29-38, CAS ABSTRACT.	1-33
A	PULATOVA M.K. et al "Fungal infection of human organs by resistant melanin-synthesizing species is one of the pathogenic factors and one of the real consequences of the accident at Chernobyl power plant" Radiation Biology and Radioecology/Russ. Acad. of Sci., July-August 1997, Vol. 37, No. 4, pages 649-56, CAS ABSTRACT.	1-33

INTERNATIONAL SEARCH REPORT

International application No.
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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:
Please See Continuation 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 additional fees, this Authority did not invite payment of any 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.

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1; and 7-8,14-21(in part) drawn to a method of enhancing organismal growth.

Group II, claim(s) 2-4;7-8(in part); 13; and 14-21(in part) drawn to a method of reducing the spread of radioactive material radiation.

Group III, claim(s) 5,6,9-12; and 7-8,14-21(in part) drawn to a method of protecting an object or subject from radiation or electronic pulses.

Group IV, claim(s) 22-25, drawn to a method of treating a building for radon.

Group V, claim(s) 26-27, drawn to a method of making a melanin material.

Group VI, claim(s) 28-29, drawn to a melanin-based coating.

Group VII, claim(s) 30,31 drawn to melanin-comprising materials.

Group VIII, claim(s) 32 drawn to a melanized organism.

Group IX, claim(s) 33 drawn to isolated melanin per se.

The inventions listed as Groups I-IX do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The technical feature of claim 1 is the combination of increasing melanin in an organism and exposing the organism to radiation; however, Wang (Wang, Y. et al. *App.Environ.Microbiol.* 1994, 60(10), 3864-3866.) teaches providing an organism having increased melanin (e.g. "brown after 3 to 5 days and heavily melanized after 5 to 8 days", page 3864). Wang further teaches exposing the organism to UV radiation (page 3864). Since the technical feature in known, the technical feature does not make a contribution over the prior art and cannot be a special technical feature. Therefore, unity of invention is lacking.

Continuation of B. FIELDS SEARCHED Item 3:
STN (CA, BIOSIS, MEDLINE)- search terms: melanin, radiation, radioactiv?, radon, fung?, cryptococcus, histoplasma, foundation, coating
EAST (US-PGPUB;USPAT;USOCR;FPRS;EPO;JPO;DERWENT) search terms: melanin, skin, radon, soil, shell