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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 April 2009 (09.04.2009)

PCT

(10) International Publication Number
WO 2009/045632 A3

(51) International Patent Classification:
*C12N **15/11*** (2006.01) *C12Q 1/68* (2006.01)

(21) International Application Number:
PCT/US2008/072327

(22) International Filing Date:
6 August 2008 (06.08.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/955,316 10 August 2007 (10.08.2007) US

(71) Applicant *(for all designated States except US):* **THE BOARD OF TRUSTEES OF THE UNIVERSITY OF ILLINOIS** [US/US]; 352 Henry Administration Building, 506 South Wright Street, Urbana, IL 61801 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only):* **LU, Yi** [CN/US]; 2512 Waterville Dr., Champaign, IL 61822 (US). **LIU, Juewen** [CN/US]; 929 Buena Vista Dr., Apt. A-203, Albuquerque, NM 87106 (US).

(74) **Agent:** RAUCH, Paul, E.; Evan Law Group LLC, 600 West Jackson Blvd., Suite 625, Chicago, IL 60661 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available):* AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, 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, ME, 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, ST, 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, HR, HU, IE, IS, **IT,** LT, LU, LV, MC, MT, NL, NO, 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:

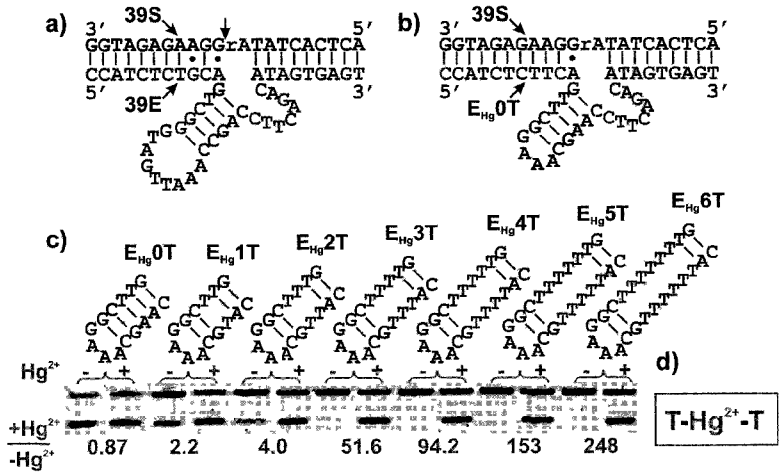
— *with international search report (Art. 21(3))*

— *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))*

(88) Date of publication of the international search report:
1 October 2009

(54) Title: NUCLEIC ACID BASED FLUORESCENT SENSOR FOR MERCURY DETECTION

FIGURE 1



(57) Abstract: A nucleic acid enzyme comprises an oligonucleotide containing thymine bases. The nucleic acid enzyme is dependent on both Hg^{2+} and a second ion as cofactors, to produce a product from a substrate. The substrate comprises a ribonucleotide, a deoxyribonucleotide, or both.

WO 2009/045632 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/072327

A. CLASSIRCATION OF SUBJECT MATTER ,
INV. C12N15/11 C12Q1/68

According lo International Patent Classification (IPC) orto 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 practical, search terms used)

EPO-Internal , BIOSIS, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropnate, of the relevant passages	Retevant to claim No.
X	WO 03/095648 A (TRUSTEES OF THE UNIVERSITY OF [US]) 20 November 2003 (2003-11-20) page 5 , lines 12-18 page 8 , line 8 - page 9 , line 2 page 13, lines 24-28 page 14, lines 3-5 figure 1	1-32
A	ONO A ET AL: "HIGHLY SELECTIVE OLIGONUCLEOTIDE-BASED SENSOR FOR MERCURY(II) IN AQUEOUS SOLUTIONS" ANGEWANDTE CHEMIE. INTERNATIONAL EDITION, WILEY VCH VERLAG, WEINHEIM, vol. 43, no. 33, 20 August 2004 (2004-08-20), pages 4300-4302, XP001235589 ISSN: 1433-7851 figures 2,3	1-32

-/--

[X] Further documents are listed in the continuation of Box C.

[X] 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 document but published on or afterthe international filing date

'L' document which may throw doubts on prtority 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 inventwe 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 docu¬ments, 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
22 July 2009	13/08/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P·B. 5818 Patentlaan 2 NL - 2280 HV Rljswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Bar Πas, Christoph

Form PCT/ISA/210 (second εhee<) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/077327

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

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

   a. type of material

   [X] a sequence listing

   [ ] table(s) related to the sequence listing

   b. format of material

   [X] on paper

   [X] in electronic form

   c. time of filing/furnishing

   [ ] contained in the international application as filed

   [ ] filed together with the international application in electronic form

   [X] furnished subsequently to this Authority for trie purpose of search

2. [X] In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto 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:

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	**LIU JUEWEN ET AL: "Rational design of turn-on allosteric DNAzyme catalytic beacons for aqueous mercury ions with ultrahigh sensitivity and selectivity" ANGEWANDTE CHEMIE. INTERNATIONAL EDITION, WILEY VCH** VERLAG, WEINHEIM, **[Online]** vol. **46, no. 40, 8 October 2007** (2007-10-08), **pages 7587-7590, XP009120264 ISSN: 1433-7851 Retrieved from the Internet: LJRL :http ://www3 .inter sci ence .w i1ey .com/cgi -bi n/i ssn?DESCRIPTOR=PRINTISSN& VALUE=1433-7851>** page 7588, left-hand column, paragraph 2 - right-hand column, paragraph 3	1-32

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2008/072327

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03095648 A	20-11-2003	AU 2003218283 A1	11-11-2003
		CA 2483069 A1	20-11-2003
		EP 1504100 A1	09-02-2005
		US 2005282186 A1	22-12-2005
		US 2004023216 A1	05-02-2004
		US 2009029874 A1	29-01-2009
		US 2009143239 A1	04-06-2009