



(51) International Patent Classification:

G01N 33/53 (2006.01) C12Q 1/68 (2006.01)
G01N 33/553 (2006.01) G01N 27/26 (2006.01)

(21) International Application Number:

PCT/US2012/023039

(22) International Filing Date:

27 January 2012 (27.01.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/437,557 28 January 2011 (28.01.2011) US

(71) Applicant (for all designated States except US): THE REGENTS OF THE UNIVERSITY OF CALIFORNIA [US/US]; 1111 Franklin Street, 5th Floor, Oakland, CA 94607-5200 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): WANG, Joseph [US/US]; 500 W. Harbor Drive, Unit 1222, San Diego, CA 92101 (US). CAMPUZANO-RUIZ, Susana [ES/ES]; C/ Sitio Del Escorial No. 8, Bajo D, E-28054 Madrid (ES).

(74) Agent: AI, Bing; Perkins Coie LLP, P.O. Box 1247, Seattle, WA 98111-1247 (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, CL, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

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))

[Continued on next page]

(54) Title: BIOAFFINITY SENSORS BASED ON SURFACE MONOLAYERS

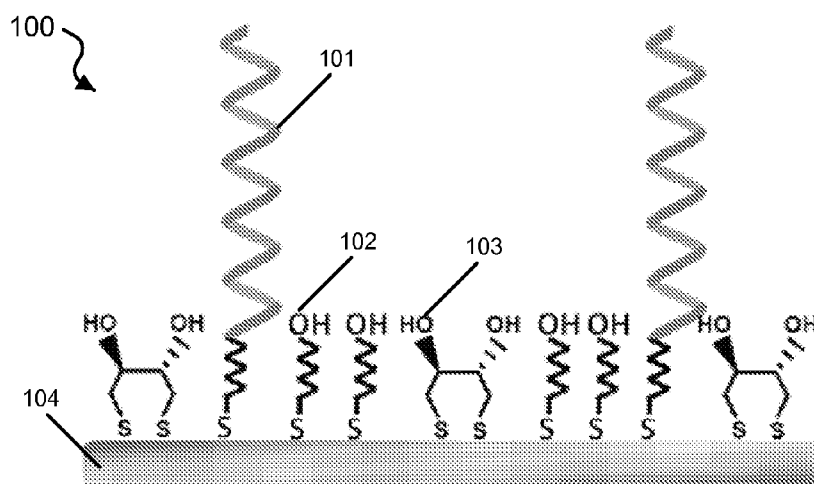


FIG. 1

(57) Abstract: Methods, systems, devices and materials are disclosed for implementing a bioaffinity sensor having a self-assembled monolayer interface for detection of a target molecule. In one aspect, a sensor device for detecting a target molecule includes a surface capable of attaching a thiol and a molecular monolayer formed on the surface that includes a molecular capture probe having a thiol region, a linear alkanethiol molecule having one thiol region, and a linear alkanedithiol molecule having two thiol regions, in which the molecular capture probe includes a region for receiving a target substance having a complimentary region that couples with the region of the molecular capture probe to generate a detectable signal.



(88) Date of publication of the international search report:
10 January 2013

A. CLASSIFICATION OF SUBJECT MATTER**G01N 33/53(2006.01)i, G01N 33/553(2006.01)i, C12Q 1/68(2006.01)i, G01N 27/26(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)

G01N 33/53; C07F 15/02; C12Q 1/68

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: thiol, capture probe, alkanethiol, alkanedithiol, self assembled monolayer, sensor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DHARUMAN, V. et al. Ternary mixed monolayers for simultaneous DNA orientation control and surface passivation for label free DNA hybridization electrochemical sensing. Biosensors and Bioelectronics, 2010, Vol. 25, pp. 2129-2134. See abstract and scheme 1.	1-45
A	SEIFERT, M. et al. Characterization of streptavidin binding to biotinylated, binary self assembled thiol monolayers- Influence of component ration and solvent. Langmuir, 2010, Vol. 26, No. 9, pp. 6386-6393. See abstract and fig. 1.	1-45
A	HARPSTER, M. H. et al. SERS detection of indirect viral DNA capture using colloidal gold and methylene blue as a Raman label. Biosensors and Bioelectronics, 2009, Vol. 25, pp. 674-681. See abstract and fig. 1.	1-45
A	US 2005/0123937 A1(THORP, H. H. et al.) Jun. 09 2005 See figs. 3, 11 and claim 1	1-45



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

16 NOVEMBER 2012 (16.11.2012)

Date of mailing of the international search report

20 NOVEMBER 2012 (20.11.2012)

Name and mailing address of the ISA/KR

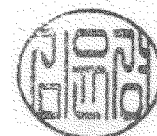
Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, YUN-KYUNG

Telephone No. 82-42-481-5605



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/023039

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CAMPUZANO, S. et al. Ternary monolayers as DNA recognition interfaces for direct and sensitive electrochemical detection in untreated clinical samples. Biosensors and Bioelectronics, Feb. 2011(available online), Vol. 26, pp. 3577-3583. See abstract and fig. 1.	1-45
PX	KURALAY, F. et al. Highly sensitive disposable nucleic acid biosensors for direct bioelectronic detection in raw biological samples. Talanta, Jun. 2011(available online) Vol. 85 pp. 1330-1337. See abstract and scheme. 1.	1-45

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/023039Patent document
cited in search reportPublication
datePatent family
member(s)Publication
date

US 2005-0123937 A1

09.06.2005

None