

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
14 December 2000 (14.12.2000)

PCT

(10) International Publication Number
WO 2000/075276 A3

- (51) International Patent Classification⁷: **C12Q 1/68**
- (21) International Application Number: PCT/IL2000/000333
- (22) International Filing Date: 7 June 2000 (07.06.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
130326 7 June 1999 (07.06.1999) IL
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- (88) Date of publication of the international search report:
8 April 2004
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.




WO 2000/075276 A3

(54) Title: DNA DETECTOR BASED ON MOLECULAR CONTROLLED SEMICONDUCTOR RESISTOR

(57) Abstract: A semiconductor device is provided for the detection of a target DNA or RNA, for example for the detection of a mutation in a gene responsible for a genetic disorder, said device being composed of: (i) at least one layer of a conducting semiconductor such as doped n-GaAs or n-(Al,Ga)As; (ii) at least one insulating or semi-insulating layer such as of an undoped semiconductor, e.g., n-GaAs or n-(Al,Ga)As; (iii) at least one single-stranded DNA probe directly adsorbed on the surface of an upper layer which is either a conducting semiconductor layer (i) or an insulating or semi-insulating layer (ii); and (iv) two conducting pads on the upper layer making electrical contact with the conducting semiconductor layer (i), such that electrical current can flow between them at a finite distance from the surface of the device. In an alternative, the upper layer has no single-stranded DNA probe and such probe can be adsorbed on the upper layer by the user at will. The DNA probe may have a sequence complementary to a sequence of the target DNA or RNA, and the detection of the target DNA is carried out by hybridization with the probe and monitoring either the current change resulting from the hybridization process when a constant electric potential is applied between the two conducting pads or measuring the change in the electric potential required to keep a constant current. Also provided are arrays of said devices suitable for DNA analysis and detection.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL00/00333

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(7) : C12Q 1/68 US CL : 435/6 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. : 435/6		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WEST and Biotech files BIOSIS, EMBASE, LIFESCI, CAPLUS, and MEDLINE		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,E	US 6,251,685 B1 (DORSEL et al.) 26 June 2001, columns 1 and 2.	1-5
Y	US 5,632,957 A (HELLER et al.) 27 May 1997, see entire document.	1-5
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See parent family annex.		
* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"B" earlier document published on or after the international filing date	"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
"L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Z"	document member of the same patent family
"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		
Date of the actual completion of the international search 17 OCTOBER 2001	Date of mailing of the international search report 26 DEC 2001	
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer:  GARY JONES Telephone No. (703) 308-0196	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL00/00333

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international 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.: 6-18
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 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 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.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.