

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
4 October 2001 (04.10.2001)

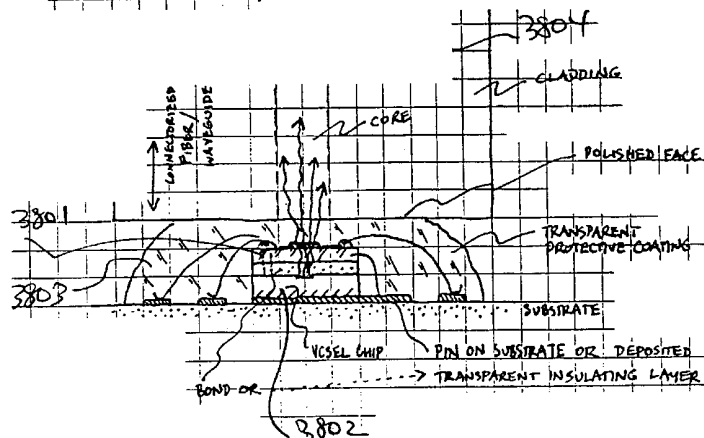
PCT

(10) International Publication Number
WO 01/73902 A3

- (51) International Patent Classification⁷: **H01S 5/0683**, 5/183, 5/022, H01L 31/00, 31/02, H01S 5/42
- (21) International Application Number: PCT/US01/09013
- (22) International Filing Date: 20 March 2001 (20.03.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/193,410 31 March 2000 (31.03.2000) US
- (71) Applicant (for all designated States except US): **AEGIS SEMICONDUCTOR** [US/US]; 170 Common Street, Suite 204, Lawrence, MA 01840 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **WAGNER, Matthias** [US/US]; 170 Common Street, Suite 204, Lawrence, MA 01840 (US).
- (74) Agent: **ENGELSON, Gary, S.**; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, MA 02210 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, 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, TR), 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:
28 February 2002
- 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.

(54) Title: AN OPTICAL COMMUNICATION DEVICE INCLUDING A SEMITRANSSPARENT OPTICAL DETECTOR

1. SUM A: PACKAGE WOULD ALLOW LOW-COST, DIRECT COUPLING IN A FIBER CONNECTOR (FIBER APERTURE < 25 μm AND MULTIMODE FIBER CORE ≈ 50-62.5 μm), VCSEL BEAM DIVERGENCE < 20°, AND PIN LAYER IS THIN).



(57) Abstract: Materials suitable for fabricating optical monitors include amorphous, polycrystalline and microcrystalline materials. Semitransparent photodetector materials may be based on silicon or silicon and germanium alloys. Conductors for connecting to and contacting the photodetector may be made from various transparent oxides, including zinc oxide, tin oxide and indium tin oxide. Optical monitor structures based on PIN diodes take advantage of the material disclosed. Various contact, lineout, substrate and interconnect structures optimize the monitors for integration with various light sources, including vertical cavity surface emitting laser (VCSEL) arrays. Complete integrated structures include a light source, optical monitor and either a package or waveguide into which light is directed.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/09013

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01S5/0683 H01S5/183 H01S5/022 H01L31/00 H01L31/02
H01S5/42

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)

IPC 7 H01S

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 899 835 A (XEROX CORP) 3 March 1999 (1999-03-03)	1-4
Y	column 13, line 13 -column 14, line 3; figures 13,14 column 15, line 32 -column 16, line 33 ---	1-5
X	US 6 037 644 A (CINA MICHAEL F ET AL) 14 March 2000 (2000-03-14) column 5, line 3-23; figures 1,4 --- -/--	1-4

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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 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

9 November 2001

Date of mailing of the international search report

15/11/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Claessen, L

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/09013

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KOBAYASHI Y ET AL: "IMPROVEMENT ON COUPLING EFFICIENCY FOR PASSIVE ALIGNMENT OF STACKEDMULTI.FIBER TAPES TO A VERTICAL-CAVITY SURFACE-EMITTING LASER ARRAY" EXTENDED ABSTRACTS OF THE INTERNATIONAL CONFERENCE ON SOLID STATE DEVICES AND MATERIALS, JAPAN SOCIETY OF APPLIED PHYSICS. TOKYO, JA, vol. CONF. 1996, 1996, pages 655-657, XP000694099 figure 1	1-5
A	WIPIEJEWSKI T ET AL: "VERTICAL-CAVITY SURFACE-EMITTING LASER DIODES FOR SHORT DISTANCE OPTICAL FIBER NETWORKS" PROCEEDINGS OF THE ELECTRONIC COMPONENTS AND TECHNOLOGY CONFERENCE. WASHINGTON, MAY 1 - 4, 1994, NEW YORK, IEEE, US, vol. CONF. 44, 1 May 1994 (1994-05-01), pages 330-334, XP000479165 ISBN: 0-7803-0914-6 figure 7	1,5
A	US 5 539 848 A (GALLOWAY DAVID) 23 July 1996 (1996-07-23) column 7, line 63 -column 8, line 25; figure 5	1,5-9
A	WO 99 30394 A (COHERENT INC) 17 June 1999 (1999-06-17) the whole document	1,9
A	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 10, 30 November 1995 (1995-11-30) & JP 07 168040 A (NIPPON STEEL CORP), 4 July 1995 (1995-07-04) abstract	1,6,8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/09013

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0899835	A	03-03-1999	US 6246708 B1 EP 0899835 A1 JP 11121735 A	12-06-2001 03-03-1999 30-04-1999
US 6037644	A	14-03-2000	AU 9223998 A WO 9914834 A1	05-04-1999 25-03-1999
US 5539848	A	23-07-1996	DE 69604333 D1 DE 69604333 T2 EP 0745873 A2 GR 3032135 T3 JP 8327843 A	28-10-1999 13-04-2000 04-12-1996 27-04-2000 13-12-1996
WO 9930394	A	17-06-1999	US 6151342 A EP 1038341 A1 WO 9930394 A1 US 6229831 B1	21-11-2000 27-09-2000 17-06-1999 08-05-2001
JP 07168040	A	04-07-1995	NONE	