

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
14 February 2002 (14.02.2002)

PCT

(10) International Publication Number  
WO 02/013341 A3

- (51) International Patent Classification<sup>7</sup>: H01S 5/00
- (21) International Application Number: PCT/IL01/00727
- (22) International Filing Date: 7 August 2001 (07.08.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
137732 7 August 2000 (07.08.2000) IL
- (71) Applicant (for all designated States except US): **XLIGHT PHOTONICS INC.** [US/US]; Suite 400, 2711 Centerville Road, Wilmington, DE 19808 (US).

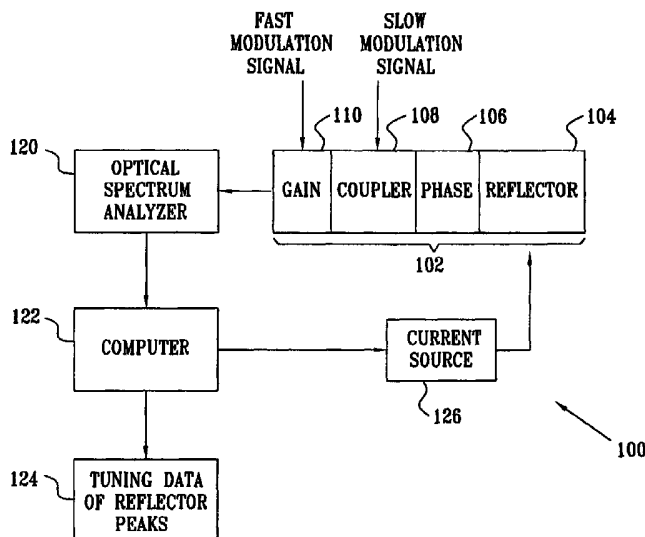
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, 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, GQ, GW, ML, MR, NE, SN, TD, TG).

- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BUIMOVICH, Efraim** [IL/IL]; 19 Yechezkel Street, 62595 Tel Aviv (IL). **RUBIN, Shmuel** [IL/IL]; 20 Moliver Street, 42241 Netanya (IL). **SADOT, Dan** [IL/IL]; 143 Kfar Bilu, 76965 (IL).
- (74) Agents: **SANFORD T. COLB & CO.** et al.; P.O. Box 2273, 76122 Rehovot (IL).

- Published:  
— with international search report
- (88) Date of publication of the international search report:  
30 October 2003

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: CHARACTERIZATION OF MULTIPLE SECTION SEMICONDUCTOR LASERS



(57) Abstract: A method for characterizing tunable semiconductor laser diodes in which the laser is stimulated in a way that discloses the optical properties and tuning current dependency of the individual sections of the laser, separately for each section, and independently of the other sections. A section of the laser is current modulated in order to excite a continuum of modes related to the spectral response of other sections. This process is observed by viewing the overall spectral response at an integration time significantly longer than the modulation time. The spectral positions of the modes and their dependence on the tuning current, are used to determine the tuning characteristic of that particular section. This method substantially reduces the time required for characterization of such lasers in comparison with prior art methods.



WO 02/013341 A3

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IL 01/00727

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01S5/00

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

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FUMIYOSHI KANO ET AL: "HIGH-SPEED INTENSITY MODULATION OF 1.5 UM DBR LASERS WITH WAVELENGTH TUNING" IEEE JOURNAL OF QUANTUM ELECTRONICS, IEEE INC. NEW YORK, US, vol. 26, no. 8, 1 August 1990 (1990-08-01), pages 1340-1346, XP000171272 ISSN: 0018-9197 page 1342, left-hand column, line 23-36	12, 13
A	WO 99 40654 A (ALTITUN AB ;ANDERSSON LARS (SE); BROBERG BJOERN (SE)) 12 August 1999 (1999-08-12) cited in the application the whole document	1-30

 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

24 March 2003

Date of mailing of the international search report

02/04/2003

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/IL 01/00727

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SARLET G ET AL: "NOVEL MODE STABILISATION SCHEME FOR WIDELY TUNABLE LASERS" 25TH EUROPEAN CONFERENCE ON OPTICAL COMMUNICATION. (ECOC'99). NICE, FRANCE, SEPT. 27 - 30, 1999. REGULAR AND INVITED PAPERS, EUROPEAN CONFERENCE ON OPTICAL COMMUNICATION (ECOC), PARIS: SEE, FR, vol. II OF II, 26 September 1999 (1999-09-26), pages II-128-II-129, XP001035414 ISBN: 2-912328-12-8 cited in the application	1,12,23, 27
A	the whole document	1,23,27
A	GAMBINI P ET AL: "AN ACCURATE TECHNIQUE FOR THE CHARACTERIZATION OF WAVELENGTH THERMAL TRANSIENTS IN TUNABLE DBR LASER" PROCEEDINGS OF THE EUROPEAN CONFERENCE ON OPTICAL COMMUNICATION (ECOC) MONTREUX, SEPT. 12 - 16, 1993. REGULAR PAPERS, ZURICH, SEV, CH, vol. 2 CONF. 19, 12 September 1993 (1993-09-12), pages 245-248, XP000492212 page 245, last paragraph	1,12,23, 27
A	US 5 499 135 A (HEIDEMANN ROLF ET AL) 12 March 1996 (1996-03-12) abstract	23,27

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL 01/00727

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9940654	A	12-08-1999	SE 519081 C2	07-01-2003
			AU 2304699 A	23-08-1999
			CA 2316820 A1	12-08-1999
			EP 1050088 A1	08-11-2000
			JP 2002503036 T	29-01-2002
			SE 9800143 A	22-07-1999
			WO 9940654 A1	12-08-1999
			US 6504856 B1	07-01-2003
			-----	
US 5499135	A	12-03-1996	AU 648365 B2	21-04-1994
			AU 8960191 A	25-06-1992
			CA 2074813 A1	25-06-1992
			DE 59105276 D1	24-05-1995
			WO 9211561 A1	09-07-1992
			EP 0516843 A1	09-12-1992
			ES 2074357 T3	01-09-1995
			JP 6500896 T	27-01-1994
			NZ 240957 A	27-04-1994
-----				