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(71) Applicant: HONEYWELL INTERNATIONAL INC. [US/US]; 101 Columbia Avenue, P.O. Box 2245, Morristown, NJ 07960 (US).

(72) Inventor: JOHNSON, Ralph, H.; 211 Ridgeview, Murphy, TX 75094 (US).

(74) Agents: CRISS, Roger, H. et al.; Honeywell International Inc., 101 Columbia Avenue, P.O. Box 2245, Morristown, NJ 07960 (US).

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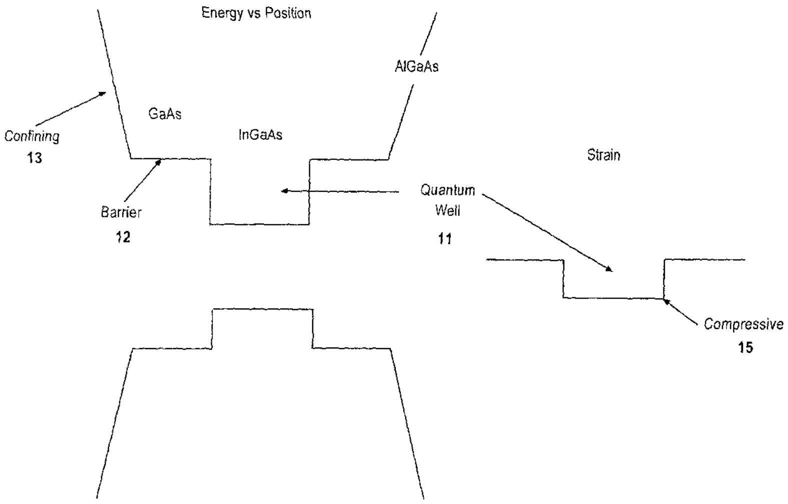
(54) Title: VERTICAL CAVITY SURFACE EMITTING LASER INCLUDING INDIUM AND ANTIMONY IN THE ACTIVE REGION



(57) Abstract: Quantum wells and associated barrier layers can be grown to include nitrogen (N), aluminum (Al), antimony (Sb), phosphorous (P) and/or indium (In) placed within or about a typical GaAs substrate to achieve long wavelength VCSEL performance, e.g., within 1260 to 1650 nm range. In accordance with features of the present invention, a vertical cavity surface emitting laser (VCSEL), can include at least one quantum well (11) comprised of InGaAsSb; barrier layers (12) sandwiching said at least one quantum well (11); and confinement layers (13) sandwiching said barrier layers (12). A vertical cavity surface emitting laser (VCSEL), can also include at least one quantum well (11) comprised of InGaAsSbN. Barrier layers (12) can be comprised of GaAsN, GaAsP, or AlGaAs. Confinement layers (13) can be comprised of AlGaAs. Quantum wells (11) can include N. Quantum well (11) can be developed up to and including 50 Å in thickness. Quantum wells (11) can also be developed with a depth of at least 40 meV.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01S5/183

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, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 00 33433 A (BRAUN WOLFGANG ;DOWD PHILIP (SG); UNIV ARIZONA (US); ZHANG YONG HA) 8 June 2000 (2000-06-08) page 19, line 20; figures 13A-13C page 11, line 26 ---	1,2
A	US 5 960 018 A (JEWELL JACK L ET AL) 28 September 1999 (1999-09-28) column 32 -column 34; claims 15-17; figures 8,9A --- -/--	1

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

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search 17 December 2003	Date of mailing of the international search report 02/01/2004
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 Hervé, D

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

Internationa cation No
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