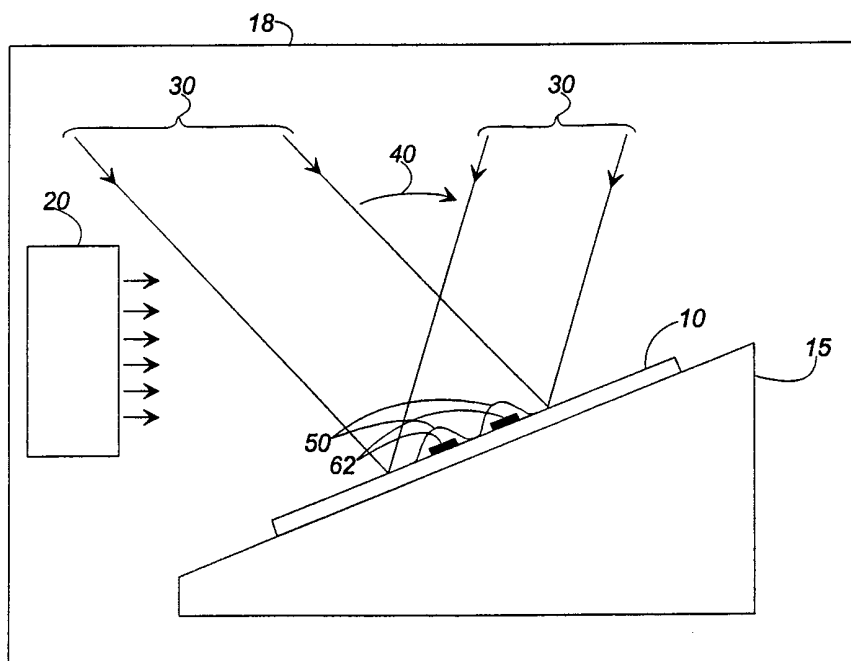




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H01L 29/06, 21/205, 21/20, 31/12, 27/14	A3	(11) International Publication Number: WO 00/07221 (43) International Publication Date: 10 February 2000 (10.02.00)
(21) International Application Number: PCT/US99/17391 (22) International Filing Date: 30 July 1999 (30.07.99) (30) Priority Data: 60/094,766 31 July 1998 (31.07.98) US (71) Applicant (for all designated States except US): EMORY UNIVERSITY [US/US]; 2009 Ridewood Drive, Atlanta, GA 30322 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): GILLILAND, Guy, D. [US/US]; 503 Northwood Trail, Southlake, TX 76092 (US). LIN, Ming-chang [US/US]; 805 Clifton Road, Atlanta, GA 30307 (US). (74) Agent: HORSTEMEYER, Scott, A.; Thomas, Kayden, Horstemeier & Risley L.L.P., 100 Galleria Parkway, Suite 1500, Atlanta, GA 30339 (US).		(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> (88) Date of publication of the international search report: 8 June 2000 (08.06.00)

(54) Title: HOLOGRAPHIC, LASER-INDUCED FABRICATION OF INDIUM NITRIDE QUANTUM WIRES AND QUANTUM DOTS

**(57) Abstract**

A semiconductor device is constructed of at least one indium nitride or indium nitride alloy nanostructure on a substrate or other thing film layer. The method used to create the semiconductor device involves illuminating the substrate (10) with lateral intensity patterning of ultraviolet light (30) in the presence of at least hydrazoic acid and a compound containing indium gas flows (20). Additionally, a semiconductor light emitting/detecting modulating device composed of at least one indium nitride or indium nitride alloy nanostructure. The method used to create the semiconductor light emitting/detecting modulating device involves embedding at least one nanostructure in the interior layer of the device. Furthermore, a monolithic photovoltaic-photoelectrochemical device wherein one layer is composed of an indium nitride or indium nitride alloy nanostructure.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/17391**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :HOIL 29/06, HOIL 21/205, HOIL 21/20, HOIL 31/12, HOIL 27/14

US CL :Please See Extra Sheet.

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. : 438/22,46, 47, 57, 93,94,96,97,483,795,796,931

257/14,15,20,21,77, 85,103, 184,414,431,461

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
noneElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WEST/BRS, CA, INSPEC**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,925,897 A (OBERMAN) 20 JULY 1999 (20.07.99), see abstract col.3, lines 12-21, col. 10, lines 35-62, col. 11,21-43	21-61
A	US 5,293,050 A (CHAPPLE-SOKOL et al) 08 MARCH 1994 (08.03.94) see figs 1E, 2 and detailed description	1-61
Y	US 5,780,355 A (MISHRA et al) 14 JULY 1998 (14.07.98) see abstract, fig.1, col.2-col. 3	1-20
A, P	US 5,989,947 A (Dilger et al) 23 NOVEMBER 1999 (23.11.99) see abstract	1-61
A,P	US 5,880,491 A (SOREF et al) 09 MARCH 1999 (09.03.99) see abstract, fig. 9	1-61

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent 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
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Date of the actual completion of the international search

12 FEBRUARY 2000

Date of mailing of the international search report

04 APR 2000

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Authorized officer

SAVITRI MULPURI

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/17391

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,583,351 A (BROWN et al) 10 DECEMBER 1996 (10.12.96) see abstract	1-20
Y,P	US 6,011,271 A (SAKUMA et al) 04 JANUARY 2000 (04. 01.00) see abstract	1-20

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US99/17391**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.:
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:

See attached Chapter I, PCT Telephone Memorandum For Lack of Unity of Invention, Form 299.

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.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/17391

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

438/22,46, 47, 57, 93,94,96,97,483,795,796,931
257/14,15,20,21,77, 85,103, 184,414,431,461