(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 November 2008 (27.11.2008)

PCT

(10) International Publication Number
WO 2008/143635 A1

(51) International Patent Classification:
H01L 27/15 (2006.01)

(21) International Application Number:
PCT/US2007/022959

(22) International Filing Date: 31 October 2007 (31.10.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/885,306 17 January 2007 (17.01.2007) US
60/944,611 18 June 2007 (18.06.2007) US

(71) Applicants *(for all designated States except US)*: **THE BOARD OF TRUSTEES OF THE UNIVERSITY OF ILLINOIS** [US/US]; 352 Henry Administration Bldg., 506 South Wright Street, Urbana, IL 61801 (US). **SEMPRIUS, INC.** [US/US]; 2530 Meridian Parkway, Suite 300, Durham, NC 27713 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **ROGERS, John** [US/US]; 2803 Valleybrook, Champaign, IL 61822 (US). **NUZZO, Ralph** [US/US]; 2413 Nottingham Court North, Champaign, IL 61821 (US). **MEITL, Matthew** [US/US]; 8100 L-4 Stonebrook Terrace, Raleigh, NC 27617 (US). **MENARD, Etienne** [FR/US]; 5215 Newhall Rd., Durham, NC 27713 (US). **BACA, Alfred, J.** [US/US]; 1601 South Bermuda Drive, Urbana, IL 61802 (US). **MOTALA, Michael** [CA/US]; 405 West Washington Street, Main Floor, Champaign, IL 61820 (US). **AHN, Jong-Hyun** [KR/US]; 803 E. Oakland Avenue, #202, Urbana, IL 61802 (US). **PARK, Sang-Il** [KR/US]; 107-c West Tomaras Avenue, Savoy, IL 61874 (US). **YU, Chang-Jae** [KR/US]; 1020 E. Kerr Ave., #201, Urbana, IL 61802 (US). **KO, Heung, Cho** [KR/US]; 300 S. Goodwin Ave., #515, Urbana, IL 61801 (US). **STOYKOVICH, Mark** [US/US]; 35 Westwood Circle, Dover, NH 03820-4321 (US). **YOON, Jongseung** [KR/US]; 1107 West Green St., Apt. 627, Urbana, IL 61801 (US).

(74) Agents: **BARONE, Stephen, B.** et al.; Greenlee, Winner And Sullivan, P.c., 4875 Pearl East Circle, Suite 200, Boulder, CO 80301 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY,

[Continued on next page]

(54) Title: OPTICAL SYSTEMS FABRICATED BY PRINTING-BASED ASSEMBLY

Fig. 2A

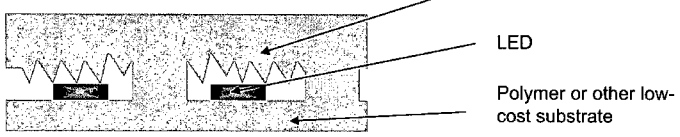
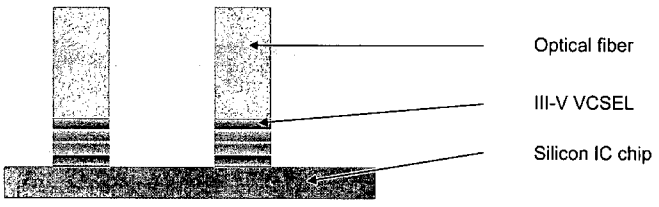


Fig. 2B



(57) Abstract: The present invention provides optical devices and systems fabricated, at least in part, via printing-based assembly and integration of device components Optical systems of the present invention comprise semiconductor elements assembled, organized and/or integrated with other device components via printing techniques that exhibit performance characteristics and functionality comparable to 10 single crystalline semiconductor based devices fabricated using conventional high temperature processing methods Optical systems of the present invention have device geometries and configurations, such as form factors, component densities, and component positions, accessed by printing that provide a range of useful device functionalities.

WO 2008/143635 A1

TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*