

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
14 April 2005 (14.04.2005)

PCT

(10) International Publication Number  
**WO 2005/034193 A3**

(51) International Patent Classification:  
**C30B 25/12** (2006.01) **C30B 25/14** (2006.01)

(21) International Application Number:  
PCT/US2004/030801

(22) International Filing Date:  
17 September 2004 (17.09.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/504,270 19 September 2003 (19.09.2003) US

(71) Applicant (for all designated States except US): **THE TRUSTEES OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK** [US/US]; 100 Low Memorial Library, 535 W. 116th Street, New York, NY 10027 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **IM, James, S.** [US/US]; 2828 Broadway #9E, New York, NY 10025 (US). **VAN DER WILT, Paul, Christian** [US/US]; 629 West 115 St., Apt. 7B, New York, NY 10025 (US).

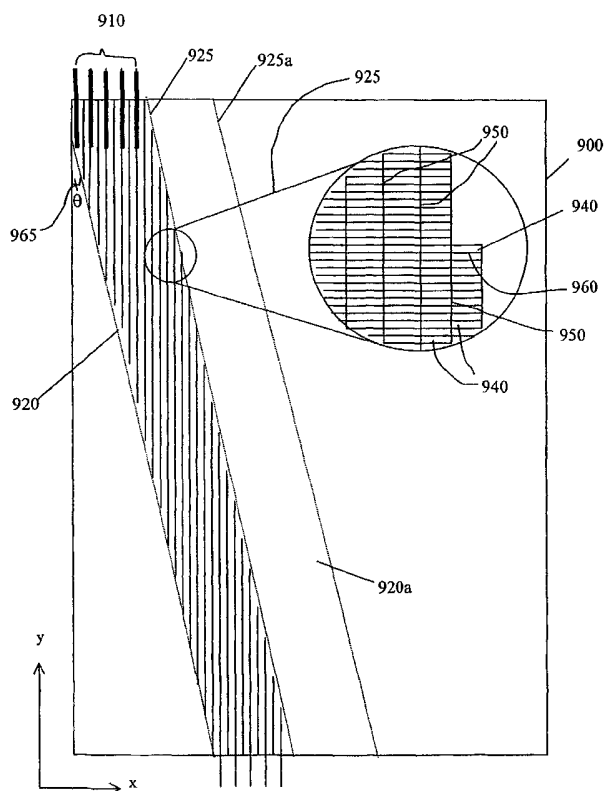
(74) Agents: **WALPERT, Gary, A.** et al.; Wilmer Cutler Pickering Hale and Dorr LLP, 399 Park Avenue, New York, NY 10022 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, 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, IT, LU, MC, NL, PL, PT, RO, SE,

[Continued on next page]

(54) Title: SINGLE SCAN IRRADIATION FOR CRYSTALLIZATION OF THIN FILMS



(57) Abstract: A method of processing a polycrystalline film on a substrate includes generating a plurality of laser beam pulses, positioning the film on a support capable of movement in at least one direction, directing the plurality of laser beam pulses through a mask to generate patterned laser beams; each of said beams having a length  $l'$ , a width  $w'$  and a spacing between adjacent beams  $d'$ , irradiating a region of the film with the patterned beams, said beams having an intensity that is sufficient to melt an irradiated portion of the film to induce crystallization of the irradiated portion of the film, wherein the film region is irradiated  $n$  times; and after irradiation of each film portion, translating either the film or the mask, or both, a distance in the  $x$ - and  $y$ -directions, where the distance of translation in the  $y$ -direction is in the range of about  $l'/n - \delta$ , where  $\delta$  is a value selected to form overlapping the beamlets from the one irradiation step to the next, and where the distance of translation in the  $x$ -direction is selected such that the film is moved a distance of about  $\lambda'$  after  $n$  irradiations, where  $\lambda' = w' + d'$ .



SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:  
14 December 2006

**Published:**

— with international search report

*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.*

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/30801

## A. CLASSIFICATION OF SUBJECT MATTER

IPC: C30B 25/12( 2006.01);C30B 25/14( 2006.01)

USPC: 117/3,89,92,103

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. : 117/3,89,92,103

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
STN (hcaplus, inspec, japio, uspatall, inpadoc)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,908,385 B2 (SPONSILI, et al) 21 June 2005(21.06.2005), columns1-24, lines 1-68k respectively	1-34

☐ Further documents are listed in the continuation of Box C.

☐ See patent family 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 application or patent 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

03 August 2006 (03.08.2006)

Date of mailing of the international search report

30 AUG 2006

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Felisa Hiteshew

Telephone No. (571) 272-1463