(19) World Intellectual Property Organization

International Bureau





PCT

(43) International Publication Date 24 April 2008 (24.04.2008)

(51) International Patent Classification: *G03F 7/00* (2006.01) *G03F 7/20* (2006.01)

(21) International Application Number:

PCT/US2006/028299

(22) International Filing Date: 21 July 2006 (21.07.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

11/203,551 12 August 2005 (12.08.2005) US

- (71) Applicant (for all designated States except US): HEWLETT-PACKARD DEVELOPMENT COMPANY, L.P. [US/US]; 20555 S. H. 249, Houston, TX 77070 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): STEWART, Duncan [CA/US]; 1501 Page Mill Road, Palo Alto, CA 94304 (US). WU, Wei [CN/US]; 1501 Page Mill Road, Palo Alto, CA 94304 (US).
- (74) Agent: COLLINS, David W.; Hewlett-packard Company, Intellectual Property Administration, P O Box 272400, M/S 35, Fort Collins, CO 80527-2400 (US).

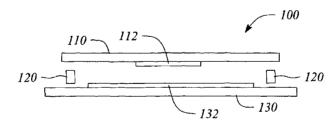
- (10) International Publication Number WO 2008/048215 A3
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, ME, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SY, 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, 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

(88) Date of publication of the international search report: 24 July 2008

(54) Title: CONTACT LITHOGRAPHY APPARATUS, SYSTEM AND METHOD



(57) Abstract: A contact lithography apparatus (100,220), system (200) and method (300) use a deformation (320) to facilitate pattern transfer (300). The apparatus (100,220), system (200) and method 300 include a spacer (120,226) that provides a spaced apart parallel and proximal orientation 310 of lithographic elements, such as a mask (110,228a,222) and a substrate (130,228b,224), when in mutual contact with the spacer (120,226). One or more of the mask (110,228a,222), the substrate (130,228b,224) and the spacer (120,226) is deformable, such that deformation (320) thereof facilitates the pattern transfer (300).



INTERNATIONAL SEARCH REPORT

International application No PCT/US2006/028299

A. CLASSIFICATION OF SUBJECT MATTER INV. G03F7/00 G03F7/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

 $\label{lem:minimum} \mbox{ Minimum documentation searched (classification system followed by classification symbols) } \mbox{ }$

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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
Χ	EP 1 376 235 A (ADTEC ENG CO LTD [JP]) 2 January 2004 (2004-01-02)	1-3,6,9, 10	
Y	paragraphs [0015], [0016], [0018]; figures 1-3 	4	
X	WO 02/07199 A (NANONEX CORP [US]; CHOU STEPHEN Y [US]) 24 January 2002 (2002-01-24) figures 3,6D page 6, lines 14-22 page 5, lines 19-23 page 4, lines 4-8	1-3,5-8,	
Υ	US 6 713 238 B1 (CHOU STEPHEN Y [US] ET AL) 30 March 2004 (2004-03-30) paragraph [0035]; figure 12	4	
	. ————————————————————————————————————		

X Further documents are listed in the continuation of Box C.	X 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 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 9 April 2008	Date of mailing of the international search report 17/04/2008			
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 ni, Fax: (+31-70) 340-3016	Authorized officer Pérennès, Frédéric			

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/028299

Relevant to claim No.		
-		
•		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2006/028299

Patent d cited in sea		Publication date		Patent family member(s)		Publication date
EP 137	6235 A	02-01-2004	CN JP TW US	1470940 2004029063 272457 2003234919	A A B A1	28-01-2004 29-01-2004 01-02-2007 25-12-2003
WO 020	7199 A	24-01-2002	AU CN EP JP JP US US	1457505 1325513 3987795 2004504718 2002132482	A1	30-01-2002 19-11-2003 09-07-2003 10-10-2007 12-02-2004 19-09-2002 28-11-2002 19-11-2002
US 671	3238 B1	30-03-2004	US US	2004118809 2002042027		24-06-2004 11-04-2002
EP 095	3878 A	03-11-1999	JP TW US	11312635 486608 6232023	A B B1	09-11-1999 11-05-2002 15-05-2001