



- (51) International Patent Classification:
G03F 9/00 (2006.01)
- (21) International Application Number:
PCT/NL2012/050271
- (22) International Filing Date:
23 April 2012 (23.04.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/478,126 22 April 2011 (22.04.2011) US
61/491,862 31 May 2011 (31.05.2011) US
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- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,
SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

- (88) Date of publication of the international search report:
25 July 2013

(54) Title: POSITION DETERMINATION IN A LITHOGRAPHY SYSTEM USING A SUBSTRATE HAVING A PARTIALLY REFLECTIVE POSITION MARK

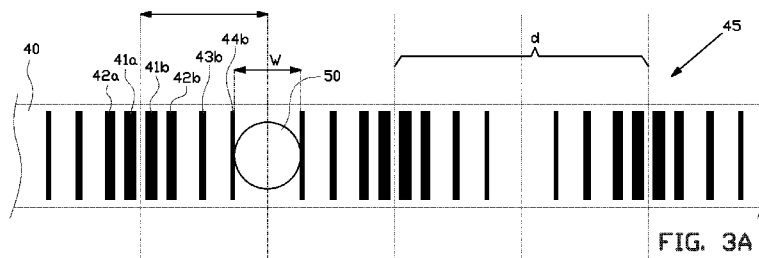


FIG. 3A

(57) Abstract: The invention relates to a substrate for use in a lithography system, said substrate being provided with an at least partially reflective position mark comprising an array of structures, the array extending along a longitudinal direction of the mark, characterized in that said structures are arranged for varying a reflection coefficient of the mark along the longitudinal direction, wherein said reflection coefficient is determined for a predetermined wavelength. In an embodiment a specular reflection coefficient varies along the substrate, wherein high order diffractions are substantially absorbed by the substrate. A position of a beam on a substrate can thus be determined based on the intensity of its reflection in the substrate. The invention further relates to a positioning device and lithography system for cooperation with the substrate, and a method of manufacture of the substrate.

WO 2012/144904 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2012/050271

A. CLASSIFICATION OF SUBJECT MATTER
INV. G03F9/00
ADD.
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)
G03F

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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 148 390 A2 (SVG LITHOGRAPHY SYSTEMS INC [US] ASML HOLDING NV [NL]) 24 October 2001 (2001-10-24) paragraphs [0014], [0032]; claim 23; figure 2c	1,2,5,8
A	EP 1 788 451 A1 (ASML NETHERLANDS BV [NL]) 23 May 2007 (2007-05-23) figures 2,3	1-26,30, 31
A	EP 1 434 103 A2 (ASML NETHERLANDS BV [NL]) 30 June 2004 (2004-06-30) paragraph [0078]	1-26,30, 31
A	US 2009/176167 A1 (HULSEBOS EDO MARIA [NL] ET AL) 9 July 2009 (2009-07-09) figures 8a,10a,11a	1-26,30, 31
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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 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 22 January 2013	Date of mailing of the international search report 08/05/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Angioni, Catherine
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INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2012/050271

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2 103 995 A2 (ASML NETHERLANDS BV [NL]) 23 September 2009 (2009-09-23) figure 2	1-26,30, 31

A	EP 2 071 402 A2 (ASML NETHERLANDS BV [NL]) 17 June 2009 (2009-06-17) figure 3	1-26,30, 31

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL2012/050271

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

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 fees, this Authority did not invite payment of additional fees.
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.:

1-26, 30, 31

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-26, 30, 31

Substrate with a mark featuring a reflection coefficient which varies along the scanning position: the mark comprises an array of structures arranged so that the pitch is a sinusoidal function of the position within the mark.

2. claims: 27-29

Method of manufacturing a mark comprising absorbing structures on a reflective substrate, the structures being spaced apart by a subwavelength distance.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/NL2012/050271

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