

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
10 July 2008 (10.07.2008)

PCT

(10) International Publication Number
WO 2008/082000 A1

(51) International Patent Classification:

H01L 21/027 (2006.01) **H01J 37/153** (2006.01)
G01N 1/00 (2006.01) **H01J 37/28** (2006.01)
G03F 7/20 (2006.01) **H01J 37/305** (2006.01)

(21) International Application Number:

PCT/JP2007/075417

(22) International Filing Date:

27 December 2007 (27.12.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2006-356875 29 December 2006 (29.12.2006) JP
2007-306627 27 November 2007 (27.11.2007) JP

(71) Applicants (for all designated States except US): **RICOH COMPANY, LTD.** [JP/JP]; 3-6, Nakamagome 1-chome, Ohta-ku, Tokyo, 1438555 (JP). **CRESTEC CORPORATION** [JP/JP]; 2-8, Tokura 4-chome, Kokubunji-shi, Tokyo, 1850003 (JP).

(72) Inventors; and

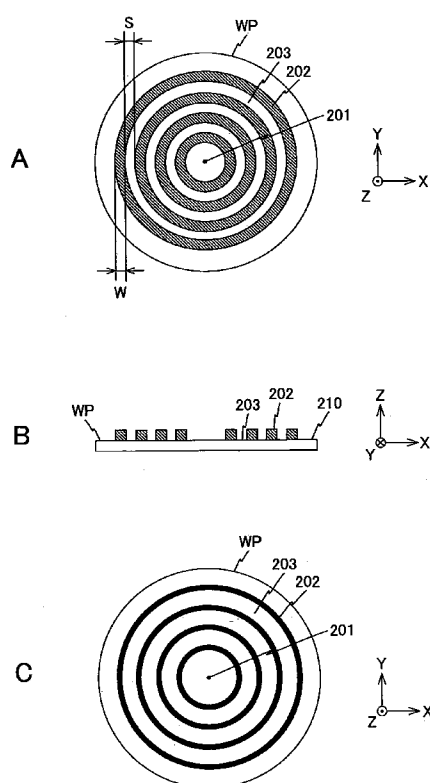
(75) Inventors/Applicants (for US only): **MIYATA, Hiroyuki** [JP/JP]; 15-8-503, Seishin 2-chome, Sagami-hara-shi, Kanagawa, 2291116 (JP). **MIYAZAKI, Takeshi** [JP/JP]; c/o CRESTEC CORPORATION, 2-8, Tokura 4-chome, Kokubunji-shi, Tokyo, 1850003 (JP). **KOBAYASHI, Kazuhiko** [JP/JP]; c/o CRESTEC CORPORATION, 2-8, Tokura 4-chome, Kokubunji-shi, Tokyo, 1850003 (JP). **HAYASHI, Kunito** [JP/JP]; c/o CRESTEC CORPORATION, 2-8, Tokura 4-chome, Kokubunji-shi, Tokyo, 1850003 (JP).

(74) Agent: **ITOH, Tadahiko**; 32nd Floor, Yebisu Garden Place Tower, 20-3, Ebisu 4-chome, Shibuya-ku, Tokyo 1506032 (JP).

(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, 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, 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,

[Continued on next page]

(54) Title: ABERRATION EVALUATION PATTERN, ABERRATION EVALUATION METHOD, ABERRATION CORRECTION METHOD, ELECTRON BEAM DRAWING APPARATUS, ELECTRON MICROSCOPE, MASTER, STAMPER, RECORDING MEDIUM, AND STRUCTURE



(57) Abstract: A method of evaluating astigmatism of an irradiation system irradiating an electron beam is disclosed. In this method, a figure pattern consisting of plural (for example, four) concentric circles is formed on a reference sample "WP" and an image (scanned image) is formed based on an electron signal obtained by scanning the electron beam onto the reference sample "WP". In the scanned image, the image has a blur in a region with its longitudinal direction parallel to the generating direction of the astigmatism and the size of the blur depends on magnitude of the astigmatism. Therefore, the direction and the magnitude of the astigmatism of the irradiation system of an irradiation apparatus can be detected based on the obtained scanned image.



PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
ZM, ZW.

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).

(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),

Published:

— *with international search report*