



- (51) **International Patent Classification:**
G03F 7/20 (2006.01) *H01L 23/544* (2006.01)
- (21) **International Application Number:**
PCT/US2022/018812
- (22) **International Filing Date:**
04 March 2022 (04.03.2022)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
63/299,010 13 January 2022 (13.01.2022) US
- (71) **Applicant:** **KLA CORPORATION** [US/US]; Legal Department, One Technology Drive, Milpitas, California 95035 (US).
- (72) **Inventors:** **FELER, Yoel**; Haviva Reich 39/12, 3254107 Haifa (IL). **GHINOVKER, Mark**; 69 HaTsyalim Street, Apt 2, 20692 Yoqneam Ilit (IL). **BEN DAVID, Nir**; Asirei

Zion 19 Street, 4528622 Hod Hasharon (IL). **UZIEL, Yoram**; 17 Hamaagal St., 20180 Yodfat (IL).

- (74) **Agent:** **MCANDREWS, Kevin** et al.; KLA Corporation, Legal Department, One Technology Drive, Milpitas, California 95035 (US).

(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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

(54) **Title:** CALIBRATED MEASUREMENT OF OVERLAY ERROR USING SMALL TARGETS

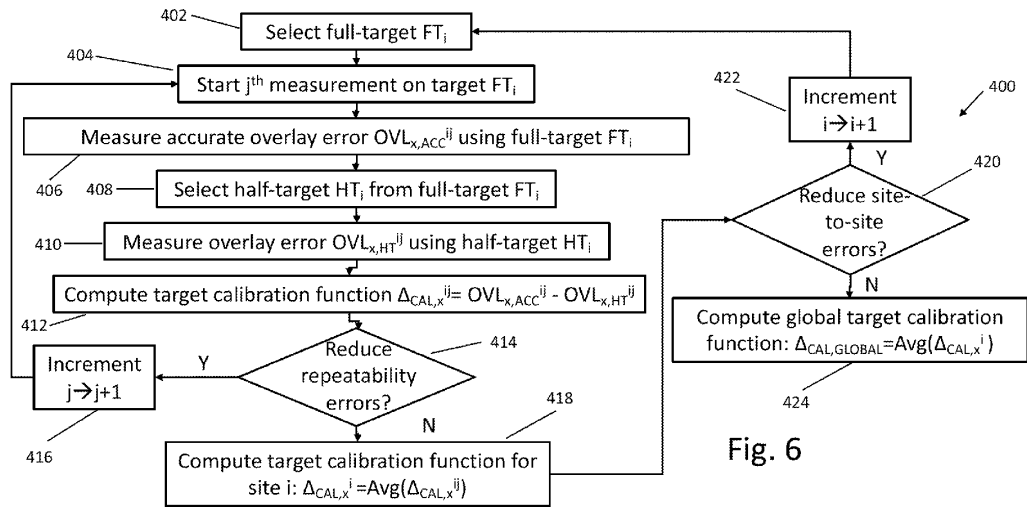


Fig. 6

(57) **Abstract:** A method for semiconductor metrology includes depositing first and second film layers on a substrate, patterning the layers to define a first target including a first feature in the first layer and a second feature in the second layer adjacent to the first feature, and a second target on the substrate including a first part, which is identical to the first target, and a second part adjacent to the first part such that the second overlay target has rotational symmetry of 180 around a normal to the substrate. The method further includes capturing and processing a first image of the second target to compute a calibration function based on the first and second parts of the target, and capturing and processing a second image of the first target while applying the calibration function to estimate an overlay error between the first and second film layers at the first location.

[Continued on next page]

GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, KM, ML, MR, NE, SN, TD, TG).

Published:

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