



(43) International Publication Date
4 April 2013 (04.04.2013)

(10) International Publication Number
WO 2013/049142 A3

- (51) **International Patent Classification:**
H01L 21/268 (2006.01) *H01L 21/26* (2006.01)
- (21) **International Application Number:**
PCT/US2012/057246
- (22) **International Filing Date:**
26 September 2012 (26.09.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/540,215 28 September 2011 (28.09.2011) US
- (71) **Applicant (for all designated States except US):** **APPLIED MATERIALS, INC.** [US/US]; 3050 Bowers Avenue, Santa Clara, CA 95054 (US).
- (72) **Inventor; and**
- (71) **Applicant (for US only):** **MOFFATT, Stephen** [GB/GB]; The Barn, Ville Canut, Rue de la Corbiere, St. Brelade, Channel Islands JE3 8QA (GB).
- (74) **Agents:** **PATTERSON, B. Todd** et al.; Patterson & Sheridan, L.L.P., 3040 Post Oak Blvd., Suite 1500, Houston, Texas 77056-6582 (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, 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, PA, 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.

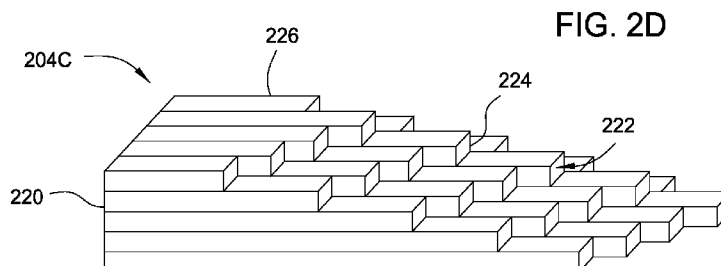
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, 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))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

- (88) **Date of publication of the international search report:**
23 May 2013

(54) **Title:** APPARATUS AND METHOD FOR SPECKLE REDUCTION IN LASER PROCESSING EQUIPMENT



(57) **Abstract:** Embodiments described herein provide apparatus and methods for processing semiconductor substrates with uniform laser energy. A laser pulse or beam is directed to a spatial homogenizer, which may be a plurality of lenses arranged along a plane perpendicular to the optical path of the laser energy, an example being a microlens array. The spatially uniformized energy produced by the spatial homogenizer is then directed to a refractive medium that has a plurality of thicknesses. Each thickness of the plurality of thicknesses is different from the other thicknesses by at least the coherence length of the laser energy.



WO 2013/049142 A3