



(43) International Publication Date
28 March 2013 (28.03.2013)

- (51) International Patent Classification:
C23F 1/00 (2006.01)
- (21) International Application Number:
PCT/IB2012/054911
- (22) International Filing Date:
17 September 2012 (17.09.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
13/237,444 20 September 2011 (20.09.2011) US
- (71) Applicant (for all designated States except US): **LAM RESEARCH CORPORATION** [US/US]; 4650 Cushing Parkway, Fremont, CA 94538 (US).
- (71) Applicant (for BZ only): **LAM RESEARCH AG** [AT/AT]; SEZ-Strasse 1, A-9500 Villach (AT).
- (72) Inventors; and
- (71) Applicants (for US only): **GAFF, Keith William** [AU/US]; 5363 Granville Court, Fremont, CA 94536 (US). **COMENDANT, Keith** [US/US]; 4350 Glidden Way, Fremont, CA 94536 (US).
- (74) Agent: **KONTRUS, Gerhard**; SEZ-Strasse 1, A-9500 Villach (AT).
- (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).

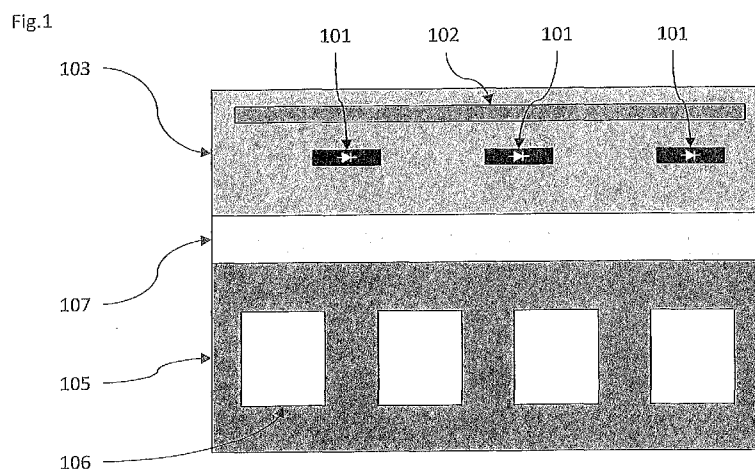
Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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))

(54) Title: HEATING PLATE WITH DIODE PLANAR HEATER ZONES FOR SEMICONDUCTOR PROCESSING



(57) Abstract: A heating plate for a substrate support assembly in a semiconductor plasma processing apparatus, comprises multiple independently controllable planar heater zones arranged in a scalable multiplexing layout, and electronics to independently control and power the planar heater zones. Each planar heater zone uses at least one diode as a heater element. A substrate support assembly in which the heating plate is incorporated includes an electrostatic clamping electrode and a temperature controlled base plate. Methods for manufacturing the heating plate include bonding together ceramic or polymer sheets having planar heater zones, power supply lines, power return lines and vias.