(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 May 2009 (07.05.2009)

PCT

(10) International Publication Number
WO 2009/058376 A3

(51) International Patent Classification:
H01L 21/205 (2006.01) *H01L 21/203* (2006.01)

(21) International Application Number:
PCT/US2008/012394

(22) International Filing Date: 31 October 2008 (31.10.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/001,112 31 October 2007 (31.10.2007) US

(71) Applicant *(for all designated States except US)*: **LAM RESEARCH CORPORATION** [US/US]; 4650 Cushing Parkway, Fremont, California 94538-6470 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **DHINDSA, Rajinder** [US/US]; 3670 Rollingside Drive, San Jose, California 95148 (US). **POVOLNY, Henry** [US/US]; 37171 Sycamore Street #136, Newark, California 94560 (US). **ANTOLIK, Jerry K.** [US/US]; P. O. Box 2148, Livermore, California 94551 (US).

(74) Agent: **SKIFF, Peter K.**; BUCHANAN INGERSOLL & ROONEY P.C., P.O. Box 1404, Alexandria, VA 22313-1404 (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, 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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

[Continued on next page]

(54) **Title:** TEMPERATURE CONTROL MODULE USING GAS PRESSURE TO CONTROL THERMAL CONDUCTANCE BETWEEN LIQUID COOLANT AND COMPONENT BODY

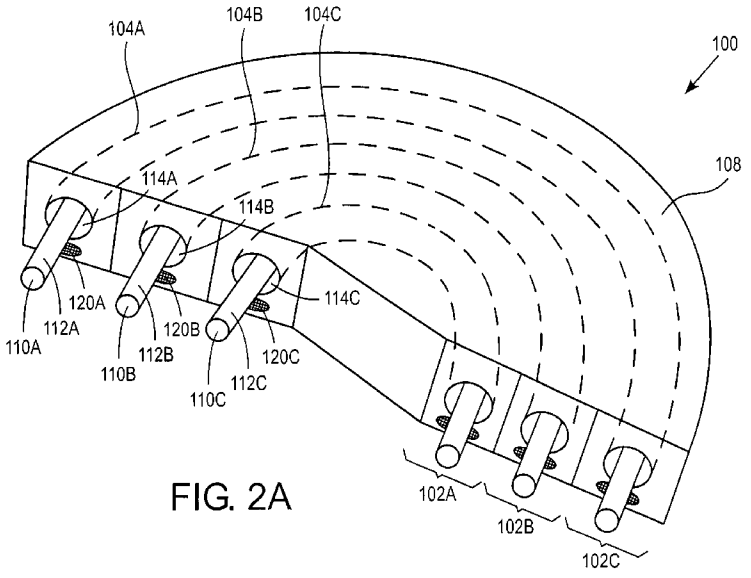


FIG. 2A

(57) **Abstract:** A temperature control module for a semiconductor processing chamber comprises a thermally conductive component body, one or more channels in the component body and one or more tubes concentric therewith, such that gas filled spaces surround the tubes. By flowing a heat transfer liquid in the tubes and adjusting the gas pressure in the spaces, localized temperature of the component body can be precisely controlled. One or more heating elements can be arranged in each zone and a heat transfer liquid can be passed through the tubes to effect heating or cooling of each zone by activating the heating elements and/or varying pressure of the gas in the spaces.

WO 2009/058376 A3

(88) Date of publication of the international search report:
16 July 2009