

(51) International Patent Classification:
C23C 16/455 (2006.01)(21) International Application Number:
PCT/IB2012/056348(22) International Filing Date:
12 November 2012 (12.11.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/560,005 15 November 2011 (15.11.2011) US
13/550,547 16 July 2012 (16.07.2012) US(71) Applicant (for all designated States except US): LAM
RESEARCH CORPORATION [US/US]; 4650 Cushing
Parkway, Fremont, California CA-94538 (US).(71) Applicant (for BZ only): LAM RESEARCH AG
[AT/AT]; SEZ-Strasse 1, A-9500 Villach (AT).

(72) Inventor; and

(71) Applicant (for US only): JACOBS KANARIK, Keren
[US/US]; 24481 Summerhill Ave, Los Altos, CA 94024
(US).(74) Agent: KONTRUS, Gerhard; SEZ-Strasse 1, A-9500 Vil-
lach (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: INERT-DOMINANT PULSING IN PLASMA PROCESSING

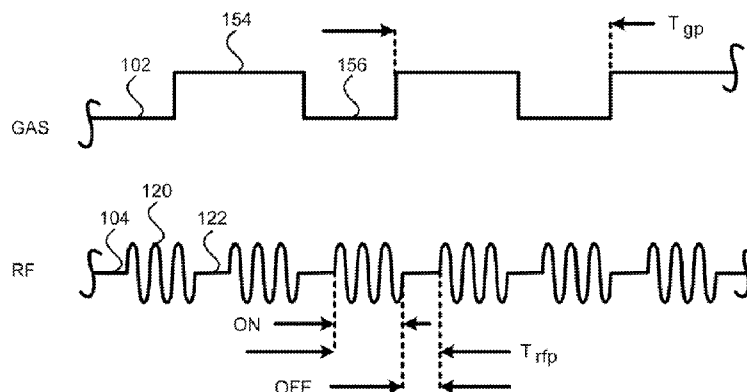


FIG. 1

(57) **Abstract:** A method for processing substrate in a processing chamber, which has at least one plasma generating source and a gas source for providing process gas into the chamber, is provided. The method includes exciting the plasma generating source with an RF signal having RF frequency. The method further includes pulsing the gas source, using at least a first gas pulsing frequency, such that a first process gas is flowed into the chamber during a first portion of a gas pulsing period and a second process gas is flowed into the chamber during a second portion of the gas pulsing period, which is associated with the first gas pulsing frequency. The second process gas has a lower reactant-gas-to-inert-gas ratio relative to a reactant-gas-to-inert-gas ratio of the first process gas. The second process gas is formed by removing at least a portion of a reactant gas flow from the first process gas.