

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
11 May 2023 (11.05.2023)



(10) International Publication Number
WO 2023/081584 A1

(51) International Patent Classification:

C23C 16/509 (2006.01) H01L 21/02 (2006.01)
C23C 16/458 (2006.01) H10B 41/27 (2023.01)
C23C 16/26 (2006.01) H10B 43/27 (2023.01)
H01J 37/32 (2006.01)

(21) International Application Number:

PCT/US2022/078501

(22) International Filing Date:

21 October 2022 (21.10.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/263,493 03 November 2021 (03.11.2021) US

(71) Applicant: LAM RESEARCH CORPORATION

[US/US]; 4650 Cushing Parkway, Fremont, California
94538 (US).

(72) Inventors: ANJOS RIGSBY, Daniela; 4650 Cushing

Parkway, Fremont, California 94538 (US). SCHROEDER,
Todd; 4650 Cushing Parkway, Fremont, California 94538
(US).

(74) Agent: HALL, Matt et al.; 900 SW 5th Ave., Suite 2300,
Portland, Oregon 97204 (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, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE,
KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU,
LY, MA, MD, 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, CV,
GH, 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, ME, 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).

(54) Title: SYSTEM AND METHOD FOR CARBON PLUG FORMATION

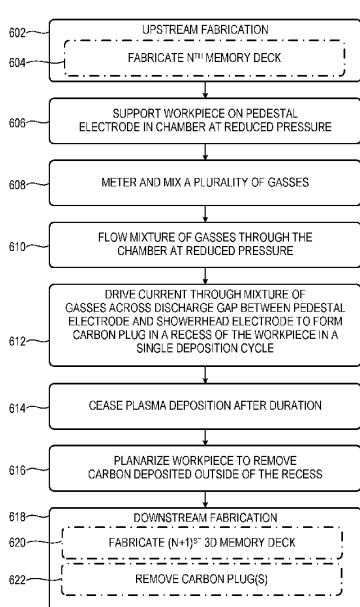


FIG. 6

(57) Abstract: One example provides a fabrication tool comprising a chamber, a pedestal electrode and a showerhead electrode arranged in the chamber, one or more gas inlets into the chamber, a vacuum pump system, a radiofrequency (RF) power source configured to form an RF plasma between the pedestal electrode and the showerhead electrode, and a controller comprising a processor and memory. The memory comprises instructions executable by the processor to operate the flow control hardware to introduce a hydrogen-containing reducing agent and a hydrocarbon gas into the chamber, and to operate the RF power source to form a plasma between the pedestal electrode and the showerhead electrode to fully deposit a carbon plug in a recess of a workpiece positioned on a pedestal within the chamber in a single plasma deposition cycle with no intermediate carbon removal process.

WO 2023/081584 A1

[Continued on next page]

Published:

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