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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 August 2023 (24.08.2023)

WIPO | PCT

(10) International Publication Number
WO 2023/158621 A1

(51) International Patent Classification:
G05B 23/02 (2006.01) *H01L 21/67* (2006.01)
G06N 20/00 (2019.01)

(21) International Application Number:
PCT/US2023/012948

(22) International Filing Date:
13 February 2023 (13.02.2023)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
17/672,595 15 February 2022 (15.02.2022) US

(71) Applicant: **APPLIED MATERIALS, INC.** [US/US]; 3050 Bowers Avenue, Santa Clara, California 95054 (US).

(72) Inventors: **HONG, Jeong Jin**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **KIM, Sang Hong**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **JANG, Mihyun**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **LEE, Jin Kyeong**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **CHEON, Sejune**; 3050 Bowers Avenue, Santa Clara, California 95054 (US).

(74) Agent: **KIMES, Benjamin A.** et al.; LOWENSTEIN SANDLER LLP, One Lowenstein Drive, Roseland, New Jersey 07068 (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,

(54) Title: PROCESS CONTROL KNOB ESTIMATION

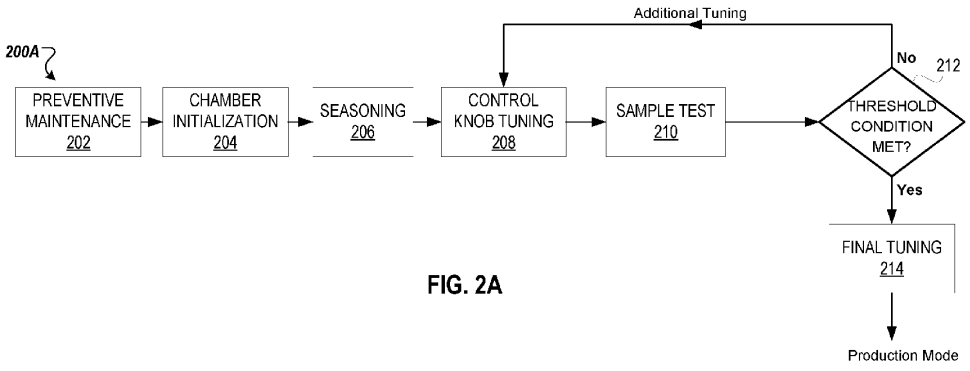

FIG. 2A

(57) Abstract: The subject matter of this specification can be implemented in, among other things, methods, systems, computer-readable storage medium. A method can include receiving (i) sensor data indicating a first state of an environment of a processing chamber processing a substrate subsequent to a chamber recovery procedure, and (ii) substrate process data indicating a set of process parameter values associated with performing a substrate processing procedure by the processing chamber having the environment in a second state prior to the chamber recovery procedure. The method further includes processing the sensor data and the substrate process data using one or more machine learning models to determine one or more outputs. The one or more outputs include an update to at least one of the set of process parameter values. The update is associated with performing the substrate processing procedure by the processing chamber having the environment in the first state.

WO 2023/158621 A1

[Continued on next page]

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).

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))*