

(12) 按照专利合作条约所公布的国际申请

(19) 世界知识产权组织
国际局

(43) 国际公布日
2025 年 2 月 6 日 (06.02.2025)



(10) 国际公布号
WO 2025/026201 A1

(51) 国际专利分类号:
G01B 17/02 (2006.01) *H01L 21/67* (2006.01)

(21) 国际申请号: PCT/CN2024/107741

(22) 国际申请日: 2024 年 7 月 26 日 (26.07.2024)

(25) 申请语言: 中文

(26) 公布语言: 中文

(30) 优先权:
202310960932.X 2023年8月1日 (01.08.2023) CN

(71) 申请人: 北京北方华创微电子装备有限公司 (**BEIJING NAURA MICROELECTRONICS EQUIPMENT CO., LTD.**) [CN/CN]; 中国北京市大兴区北京经济技术开发区文昌大道 8 号, Beijing 100176 (CN)。

(72) 发明人: 曹振勇 (**CAO, Zhenyong**); 中国北京市大兴区北京经济技术开发区文昌大道 8 号, Beijing 100176 (CN)。

(74) 代理人: 北京天昊联合知识产权代理有限公司 (**TEE & HOWE INTELLECTUAL PROPERTY ATTORNEYS**); 中国北京市东城区东长安街 1 号东方广场东方经贸城西一办公楼 5 层 1, 6-12 室, Beijing 100738 (CN)。

(81) 指定国(除另有指明, 要求每一种可提供的国家保护): 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, MU, 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) 指定国(除另有指明, 要求每一种可提供的地区保护): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, RU, TJ, TM), 欧洲 (AL, AT, BE,

(54) **Title:** PROCESS CHAMBER CLEANLINESS TESTING METHOD AND PROCESS CHAMBER

(54) 发明名称: 工艺腔室的洁净度检测方法和工艺腔室

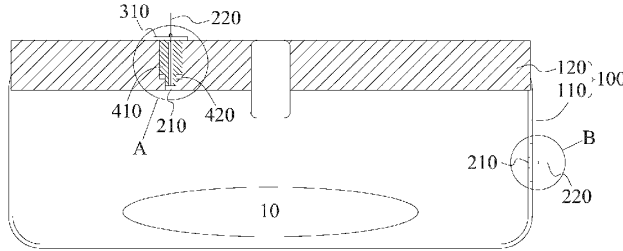


图 1

(57) **Abstract:** Provided in the present application are a process chamber cleanliness testing method and a process chamber. The process chamber comprises a cavity and at least one crystal oscillator, the crystal oscillator being fixedly arranged on the cavity, and the crystal oscillator having a deposit-measuring surface facing the interior of the cavity. The process chamber cleanliness testing method comprises: measuring the current inherent frequency of the crystal oscillator; according to the current inherent frequency of the crystal oscillator, determining the thickness of a deposited film layer on a corresponding inner wall of the cavity; and when the thickness of the deposited film layer is greater than a first preset thickness threshold value, determining that the process chamber needs to be cleaned. In the present application, the thickness of the deposited film layer is determined by means of the crystal oscillator arranged in the process chamber, allowing for real-time, accurate monitoring of the interior state of the process chamber; thus, the method of introducing a testing wafer and carrying out a specific testing process is not needed to confirm the interior state of the chamber, thereby improving the efficiency of process chamber maintenance, ensuring semiconductor process effects, and increasing wafer product yield rate.

[见续页]

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)。

本国际公布：
— 包括国际检索报告(条约第21条(3))。

(57) 摘要: 本申请提供一种工艺腔室的洁净度检测方法和工艺腔室, 工艺腔室包括腔体和至少一个晶振, 晶振固定设置在腔体上且晶振具有朝向腔体内部的沉积检测面, 工艺腔室的洁净度检测方法包括: 检测晶振的当前固有频率; 根据晶振的当前固有频率确定对应的腔体内壁上的沉积膜层厚度; 当沉积膜层厚度大于第一预设厚度阈值时, 判定需要对工艺腔室进行清洗。本申请通过设置在工艺腔室中的晶振确定沉积膜层的厚度, 能够实时精确监测工艺腔室内部状况, 不必通过传入检测晶圆并进行特定检测工艺的方式确认腔室内部情况, 提高了对工艺腔室进行维护的效率, 保证了半导体工艺效果, 提升了晶圆产品良率。