

(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
2023 年 11 月 2 日 (02.11.2023)



(10) 国际公布号
WO 2023/207550 A1

(51) 国际专利分类号:
H01L 21/67 (2006.01) **H01J 37/34** (2006.01)

(21) 国际申请号: PCT/CN2023/086808

(22) 国际申请日: 2023 年 4 月 7 日 (07.04.2023)

(25) 申请语言: 中文

(26) 公布语言: 中文

(30) 优先权:
202210452382.6 2022 年 4 月 27 日 (27.04.2022) 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: 王磊 (**WANG, Lei**); 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)。 杨帆 (**YANG, Fan**); 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)。 田西强 (**TIAN, Xiqiang**); 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 PROPER TY 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

(54) **Title:** SEMICONDUCTOR PROCESS CHAMBER AND UPPER ELECTRODE STRUCTURE THEREOF

(54) 发明名称: 半导体工艺腔室及其上电极结构

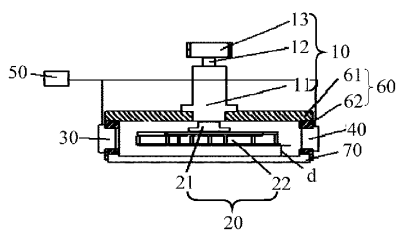


图 2

(57) **Abstract:** The present invention provides a semiconductor process chamber and an upper electrode structure thereof. The upper electrode structure comprises a magnetron component, an emitting component, a receiving component, a target material and a signal processing device. The magnetron component is located above the target material. The emitting component and the receiving component are arranged opposite each other on two sides of the magnetron component in a horizontal direction. The emitting component is used for emitting a plurality of optical signals to the receiving component, and the plurality of optical signals are a plurality of light rays which are spaced apart from each other in a vertical direction. The receiving component is used for receiving the plurality of optical signals, converting the plurality of optical signals into electrical signals and sending the electrical signals to the signal processing device. The signal processing device is used for determining the vertical distance between the magnetron component and the target material according to the electrical signals. In the present invention, the magnetron component can block light rays, which are emitted by the emitting component, within a corresponding height range, so that the height of the magnetron component can be determined in real time according to the condition of the light rays that have been received by the receiving component, thereby improving the efficiency of determining the position of the magnetron component, and ensuring the accuracy of the position of the magnetron component.

WO 2023/207550 A1

[见续页]

(AM, AZ, BY, KG, KZ, RU, TJ, TM), 欧洲 (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)。

本国际公布：
— 包括国际检索报告(条约第21条(3))。

(57) 摘要: 本发明提供一种半导体工艺腔室及其上电极结构，上电极结构包括磁控管组件、发射组件、接收组件、靶材和信号处理装置；磁控管组件位于靶材上方；发射组件与接收组件相对设置在磁控管组件沿水平方向的两侧；发射组件用于向接收组件发射多个光信号，多个光信号为多束沿竖直方向间隔设置的光线；接收组件用于接收多个光信号，将多个光信号转换成电信号并发送给信号处理装置；信号处理装置用于根据电信号确定磁控管组件与靶材之间的竖直间距。在本发明中，磁控管组件能够阻挡发射组件发出的对应高度范围内的光线，进而可根据接收组件接收到光线的情况实时确定磁控管组件的高度，提高确定磁控管组件位置的效率，并保证磁控管组件位置的精确性。