

(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



(10) 国际公布号
WO 2025/107904 A1

(43) 国际公布日
2025 年 5 月 30 日 (30.05.2025)

(51) 国际专利分类号:
C25D 17/10 (2006.01) **C25D 21/12** (2006.01)
C25D 7/12 (2006.01) **H01L 21/288** (2006.01)

(21) 国际申请号: PCT/CN2024/123497

(22) 国际申请日: 2024 年 10 月 8 日 (08.10.2024)

(25) 申请语言: 中文

(26) 公布语言: 中文

(30) 优先权:
202311550406.2 2023 年 11 月 20 日 (20.11.2023) CN

(71) 申请人: 盛美半导体设备 (上海) 股份有限公司 (ACM RESEARCH (SHANGHAI), INC.) [CN/CN];
中国上海市浦东新区中国 (上海) 自由贸易试验区蔡伦路 1690 号第 4 幢 201203 (CN)。

(72) 发明人: 石轶 (SHI, Yi); 中国上海市浦东新区中国 (上海) 自由贸易试验区蔡伦路 1690 号第 4 幢 201203 (CN)。任正博 (REN, Zhengbo); 中国上海市浦东新区中国 (上海) 自由贸易试验区蔡伦路 1690 号第 4 幢 201203 (CN)。陈浩天 (CHEN, Haotian); 中国上海市浦东新区中国 (上海) 自由贸易试验区蔡伦路 1690 号第 4 幢 201203 (CN)。金一诺 (JIN, Yinuo); 中国上海市浦东新区中国 (上海) 自由贸易试验区蔡伦路 1690 号第 4 幢 201203 (CN)。胡瑜璐 (HU, Yulu); 中国上海市浦东新区中国 (上海) 自由贸易试验区蔡伦路 1690 号第 4 幢 201203 (CN)。孙凯凯 (SUN, Kaikai); 中国上海市浦东新区中国 (上海) 自由贸易试验区蔡伦路 1690 号第 4 幢 201203 (CN)。

(54) Title: ELECTROPLATING METHOD AND ELECTROPLATING APPARATUS

(54) 发明名称: 电镀方法及电镀装置

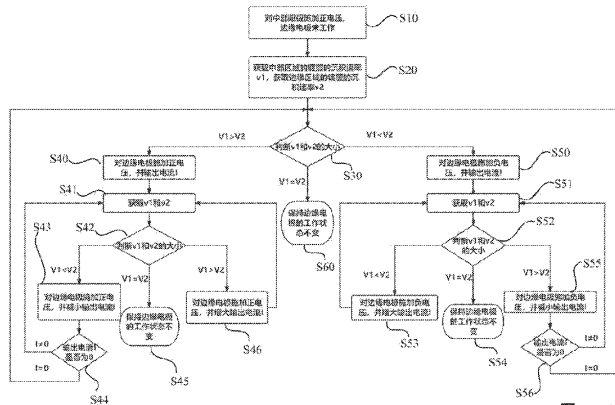


图 10

- S10 Apply a positive voltage to an intermediate anode, and an edge electrode does not operate
- S20 Acquire a deposition rate v_1 of a plating layer of an intermediate region, and acquire a deposition rate v_2 of a plating layer of an edge region
- S30, S42, S52 Determine the magnitudes of v_1 and v_2
- S40 Apply the positive voltage to the edge electrode, and output a current I
- S41, S51 Acquire v_1 and v_2
- S43 Apply the positive voltage to the edge electrode, and reduce the output current I
- S44, S56 Is the output current I equal to 0?
- S45, S54, S60 Keep an operating state of the edge electrode unchanged
- S46 Apply the positive voltage to the edge electrode, and increase the output current I
- S50 Apply a negative voltage to the edge electrode, and output the current I
- S53 Apply the negative voltage to the edge electrode, and increase the output current I
- S55 Apply the negative voltage to the edge electrode, and reduce the output current I

(57) Abstract: An electroplating method and an electroplating apparatus, which relate to the technical field of semiconductor processing. The electroplating method comprises: S10, applying a positive voltage to an intermediate anode, and an edge electrode not operating; S20, acquiring a deposition rate v_1 of a plating layer of an intermediate region, and acquiring a deposition rate v_2 of a plating layer of an edge region; S30, determining the magnitudes of v_1 and v_2 ; S40, if v_1 is greater than v_2 , applying the positive voltage to the edge electrode, and outputting a current I ; S50, if v_1 is less than v_2 , applying a negative voltage to the edge electrode, and outputting the

[见续页]

(74) 代理人:上海专利商标事务所有限公司(SHANGHAI PATENT & TRADEMARK LAW OFFICE, LLC); 中国上海市徐汇区桂平路435号 200233 (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, 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))。

current I; and S60, if v1 is equal to v2, keeping an operating state of the edge electrode unchanged. By means of respectively acquiring deposition rates of plating layers of an intermediate region and an edge region, and controlling the voltage and current of an edge electrode accordingly, the deposition rate of the edge region can be dynamically adjusted, such that the deposition rates of the edge region and the intermediate region can be balanced in real time, thereby improving the uniformity of electroplating.

(57) 摘要: 一种电镀方法及电镀装置, 涉及半导体加工技术领域, 所述电镀方法包括: S10、对中部阳极施加正电压, 边缘电极未工作; S20、获取所述中部区域的镀层的沉积速率为v1, 获取所述边缘区域的镀层的沉积速率为v2; S30、判断v1和v2的大小; S40、若v1>v2, 则对边缘电极施加正电压, 并输出电流I; S50、若v1<v2, 则对边缘电极施加负电压, 并输出电流I; S60、若v1=v2, 保持边缘电极的工作状态不变。通过分别获取中部区域和边缘区域的镀层的沉积速率, 依据此控制边缘电极的电压和电流, 边缘区域的沉积速率能够动态地调整, 进而能够实时地平衡边缘区域和中部区域的沉积速率, 从而提高了电镀的均匀性。