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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
19 May 2023 (19.05.2023)

WIPO | PCT

(10) International Publication Number
WO 2023/086009 A1

(51) International Patent Classification:
G02F 1/025 (2006.01) *G02F 1/225* (2006.01)
G02F 1/21 (2006.01)

(21) International Application Number:
PCT/SG2021/050692

(22) International Filing Date:
11 November 2021 (11.11.2021)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **ADVANCED MICRO FOUNDRY PTE LTD** [SG/SG]; 11 Science Park Rd, Singapore 117685, Singapore 117685 (SG).

(72) Inventors: **LI, Qiang**; 11 Science Park Rd, Singapore 117685, Singapore 117685 (SG). **LUO, Xianshu**; 11 Science Park Rd, Singapore 117685, Singapore 117685 (SG).

(74) Agent: **AMICA LAW LLC**; 77 Robinson Road, #22-01 Robinson 77, Singapore 068896 (SG).

(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, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, 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, 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, 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:
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report (Art. 21(3))*

(54) Title: III-V/SI HYBRID MOS OPTICAL MODULATOR WITH A TRAVELING-WAVE ELECTRODE

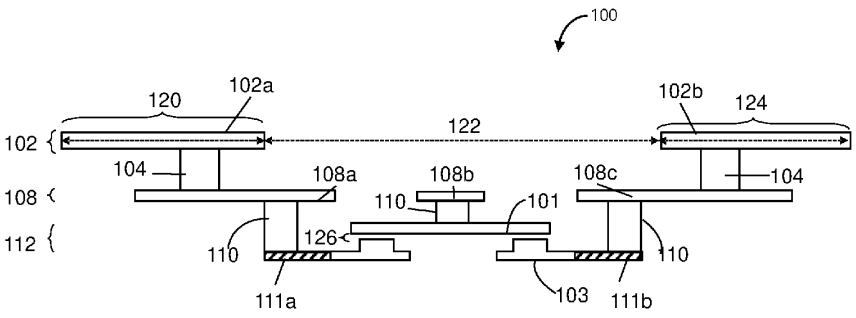


FIG. 1

(57) Abstract: A III-V/Si hybrid MOS optical modulator with a traveling-wave electrode for high-efficiency and high-bandwidth optical modulation is disclosed. The III-V/Si hybrid MOS optical modulator equipped with a traveling-wave electrode becomes a traveling-wave modulator. The traveling-wave modulator comprises a III-V compound semiconductor layer, a silicon layer and an oxide layer between the III-V compound semiconductor layer and the silicon layer. The traveling-wave modulator comprises of at least one first metallic layer, at least one second metallic layer and a semiconductor layer. The electrode trace width of each second metallic layer and the spacing between adjacent second metallic layers are adjusted to achieve the impedance and velocity matching. A traveling-wave electrode is designed to integrate with the III-V/Si hybrid MOS optical modulator under forward and reverse bias.

WO 2023/086009 A1