



(51) International Patent Classification:

B22F 10/25 (2021.01) B33Y 30/00 (2015.01)  
B33Y 10/00 (2015.01) B33Y 80/00 (2015.01)

(21) International Application Number:

PCT/SG2024/050329

(22) International Filing Date:

17 May 2024 (17.05.2024)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10202301426T 22 May 2023 (22.05.2023) SG

(71) Applicant: **NANYANG TECHNOLOGICAL UNIVERSITY** [SG/SG]; 50 Nanyang Avenue, Singapore 639798 (SG).

(72) Inventors: **LIM, Choon Wee Joel**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG). **CHAN, Wai Lee**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG). **TRAN, Anh Tuan**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG). **HO, Wee Kiat Desmond**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG).

(74) Agent: **NG, Bingxiu Edward**; Marks & Clerk Singapore LLP, Tanjong Pagar Post Office, P O Box 636, Singapore 910816 (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, 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) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, 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, 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).

(54) Title: DIRECTED ENERGY DEPOSITION APPARATUS AND METHOD

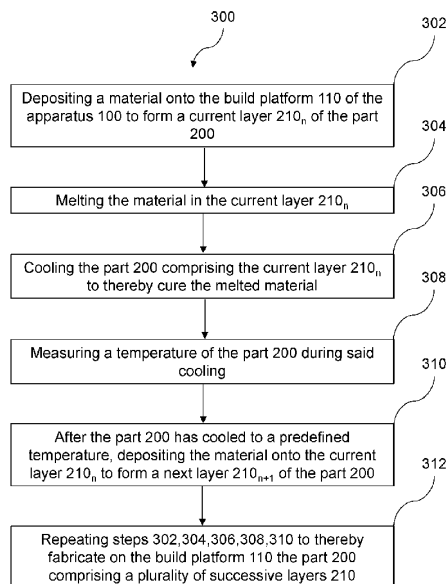


FIG. 3

(57) Abstract: The present disclosure generally relates to a directed energy deposition apparatus (100) and method (300) for additively manufacturing a part (200). The method (300) comprises steps: depositing (302) a material onto a build platform (110) of the apparatus (100) to form a current layer (210<sub>n</sub>) of the part (200); melting (304) the material in the current layer (210<sub>n</sub>); cooling (306) the part (200) comprising the current layer (210<sub>n</sub>) to thereby cure the melted material; measuring (308) a temperature of the part (200) during said cooling; after the part (200) has cooled to a predefined temperature, depositing (310) the material onto the current layer to form a next layer (210<sub>n+1</sub>) of the part (200); and repeating (312) to thereby fabricate on the build platform (110) the part (200) comprising a plurality of successive layers (210).

**Declarations under Rule 4.17:**

— *of inventorship (Rule 4.17(iv))*

**Published:**

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