



(51) International Patent Classification:

B29C 64/106 (2017.01) B33Y 30/00 (2015.01)
B29C 64/40 (2017.01) B33Y 70/00 (2020.01)
B33Y 10/00 (2015.01)

(21) International Application Number:

PCT/SG2021/050784

(22) International Filing Date:

10 December 2021 (10.12.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10202012429U 11 December 2020 (11.12.2020) SG

(71) Applicant: SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN [SG/SG]; 8 Somapah Road, Singapore 487372 (SG).

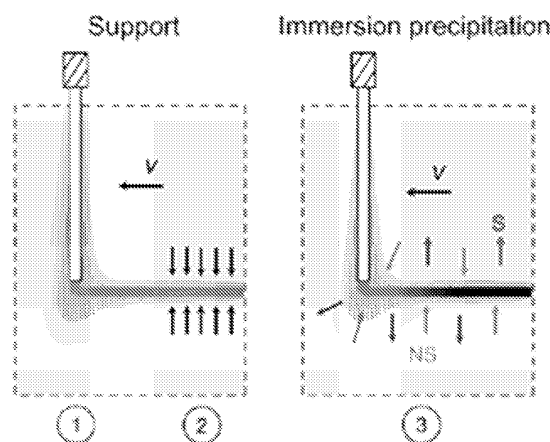
(72) Inventors: HASHIMOTO, Michinao; c/o Singapore University of Technology and Design, 8 Somapah Road, Singapore 487372 (SG). KARYAPPA, Rahul; c/o Singapore University of Technology and Design, 8 Somapah Road, Singapore 487372 (SG).

(74) Agent: VIERING, JENTSCHURA & PARTNER LLP; P.O. Box 1088, Rochor Post Office, Rochor Road, Singapore 911833 (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,

(54) Title: FREEFORM POLYMER PRECIPITATION (FPP) IN MICROPARTICULATE GELS

FIG. 1E



(57) Abstract: Herein disclosed is a method of printing a 3D freeform structure in an embedding medium. The method includes providing an ink composition in a nozzle, wherein the ink composition includes a thermoplastic, a non-thermoplastic, a thermally degradable polymer, and/or a thermosensitive polymer, dissolved in a solvent; dispensing the ink composition through a nozzle into the embedding medium to precipitate a printed structure from the ink composition, wherein the ink composition exits from the nozzle directly in the embedding medium; and maintaining the printed structure in the embedding medium until the immersion precipitation is completed for forming the 3D freeform structure. A system operable to carry out the method is also disclosed. The system includes a syringe coupled to a nozzle, wherein the syringe is operable to dispense an ink composition including a thermoplastic, a non-thermoplastic, a thermally degradable polymer, and/or a thermosensitive polymer, dissolved in a solvent, a motion control module which controls vertical and horizontal positioning of the syringe, and a support bath configured to house the embedding medium.

[Continued on next page]

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).

Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*