

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
28 November 2019 (28.11.2019)



(10) International Publication Number
WO 2019/227105 A1

(51) International Patent Classification:

A61L 27/36 (2006.01) *B01L 3/00* (2006.01)
A61F 2/02 (2006.01) *C12M 3/00* (2006.01)
A61M 1/10 (2006.01) *C12N 5/00* (2006.01)
B01F 5/06 (2006.01)

(21) International Application Number:

PCT/US2019/034219

(22) International Filing Date:

28 May 2019 (28.05.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/676,602 25 May 2018 (25.05.2018) US

(71) Applicant: **THE GENERAL HOSPITAL CORPORATION** [US/US]; 55 Fruit Street, Boston, MA 02114 (US).

(72) Inventors: **VACANTI, Joseph P.**; 14 Woodside Road, Winchester, MA 01890 (US). **HANCOCK, Matthew J.**; 47A Kearney Road, Needham, MA 02494 (US). **OLIVER, Mark S.**; 19 Warwick Street, Boston, MA 02120 (US). **SPANN, Andrew P.**; 47A Kearney Road, Needham, MA 02494 (US).

(74) Agent: **BERSON, Bennett J.**; Quarles & Brady LLP, 411 E. Wisconsin Ave., Milwaukee, WI 53202 (US).

(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, 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, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, 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))

(54) Title: ADDITIVE MANUFACTURE OF COMPLEX IMPLANTABLE LIVING DEVICES

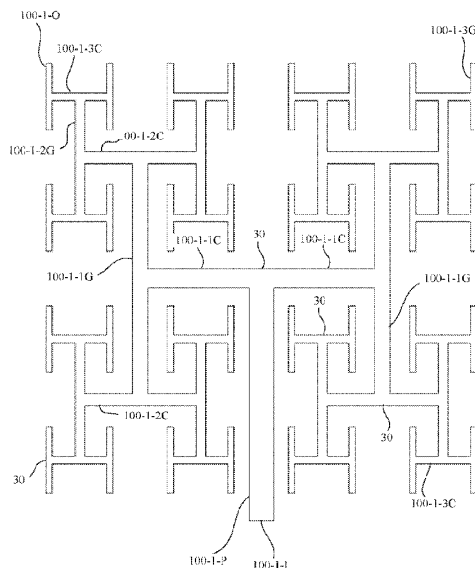


FIG. 1

(57) Abstract: A cell-scaffold device includes at least one channel network including an inlet, a plurality of channels include a parent channel having an end portion communicating with the inlet and another end portion communicating with a first bifurcation, forming two child channels. Each child channel has an end portion communicating with a respective end portion of the first bifurcation and another end portion communicating with a second bifurcation, forming two grand-child channels from each child channel. Each grand-child channel has an end portion communicating with a respective end portion of the second bifurcation and another end portion. The other end portion of the grand-child channel either forms an outlet or a third child channel in communication with the grand-child channel. Each forming of grand-child channels defines a generation of the fractal structure. The devices are of use as scaffolds for seeding, growing, and maintaining cells implanted in and/or on the device.

WO 2019/227105 A1