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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 January 2010 (21.01.2010)

PCT

(10) International Publication Number
WO 2010/008905 A3

(51) International Patent Classification:
G01N 33/00 (2006.01) *C12M 3/00* (2006.01)

(21) International Application Number:
PCT/US2009/048530

(22) International Filing Date:
24 June 2009 (24.06.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/132,977 24 June 2008 (24.06.2008) US

(71) Applicant *(for all designated States except US)*: **THE CURATORS OF THE UNIVERSITY OF MISSOURI** [US/US]; 316 University Hall, Columbia, MO 65211 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **FORGACS, Gabor** [US/US]; 16 Pleasant St., Potsdam, NY 13676 (US). **MARGA, Francoise, Suzanne** [FR/US]; 1401 Asland Rd., Apt. K, Columbia, MO 65201 (US). **NOROTTE, Cyrille** [FR/FR]; 53 Boulevard Suchet, F-75016 Paris (FR).

(74) Agents: **WALTERS, N., Chris** et al.; Senniger Powers LLP, 100 North Broadway, 17th Floor, St. Louis, MO 63102 (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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

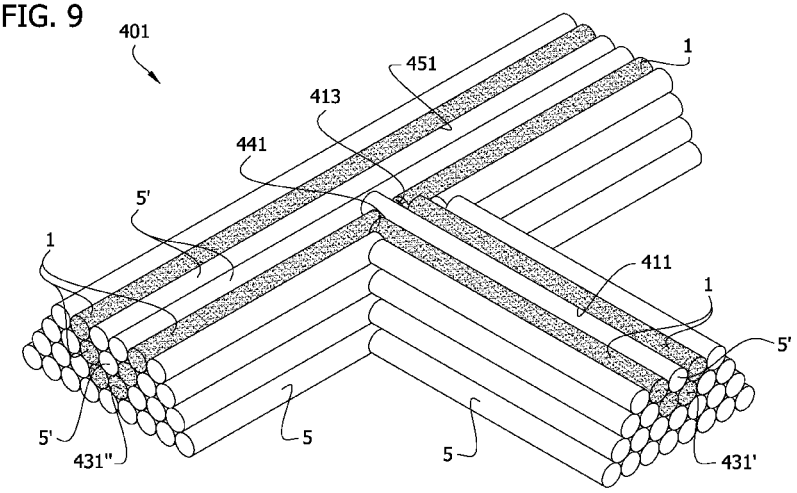
— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

[Continued on next page]

(54) Title: SELF-ASSEMBLING MULTICELLULAR BODIES AND METHODS OF PRODUCING A THREE-DIMENSIONAL BIOLOGICAL STRUCTURE USING THE SAME

FIG. 9



(57) Abstract: Structures and methods for tissue engineering include a multicellular body including a plurality of living cells. A plurality of multicellular bodies can be arranged in a pattern and allowed to fuse to form an engineered tissue. The arrangement can include filler bodies including a biocompatible material that resists migration and ingrowth of cells from the multicellular bodies and that is resistant to adherence of cells to it. Three-dimensional constructs can be assembled by printing or otherwise stacking the multicellular bodies and filler bodies such that there is direct contact between adjoining multicellular bodies, suitably along a contact area that has a substantial length. The direct contact between the multicellular bodies promotes efficient and reliable fusion. The increased contact area between adjoining multicellular bodies also promotes efficient and reliable fusion. Methods of producing multicellular bodies having characteristics that facilitate assembly of the three-dimensional constructs are also provided.

WO 2010/008905 A3

(88) Date of publication of the international search report:
27 May 2010