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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
05 March 2020 (05.03.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/047504 A3

(51) International Patent Classification:
C12M 3/06 (2006.01) *C12M 1/42* (2006.01)

(21) International Application Number:
PCT/US2019/049210

(22) International Filing Date:
30 August 2019 (30.08.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/725,382 31 August 2018 (31.08.2018) US

(71) Applicant: **THE CHARLES STARK DRAPER LABORATORY, INC.** [US/US]; 555 Technology Square, Cambridge, Massachusetts 02139 (US).

(72) Inventors: **TANDON, Vishal**; 555 Technology Square, Cambridge, Massachusetts 02139 (US). **LISSANDRELLO, Charles A.**; 555 Technology Square, Cambridge, Massachusetts 02139 (US). **BALESTRINI, Jenna L.**; 555 Technology Square, Cambridge, Massachusetts 02139 (US). **COPPETA, Jonathan R.**; 555 Technology Square, Cambridge, Massachusetts 02139 (US). **SWIERK, Patricia A.**; 555 Technology Square, Cambridge, Massachusetts 02139 (US).

(74) Agent: **HOUSTON, J. Grant**; HOUSTONHOGLE LLP, 1666 Massachusetts Avenue, Suite 12, Lexington, Massachusetts 02420 (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.

(54) Title: METHOD AND APPARATUS FOR HIGH THROUGHPUT HIGH EFFICIENCY TRANSFECTION OF CELLS

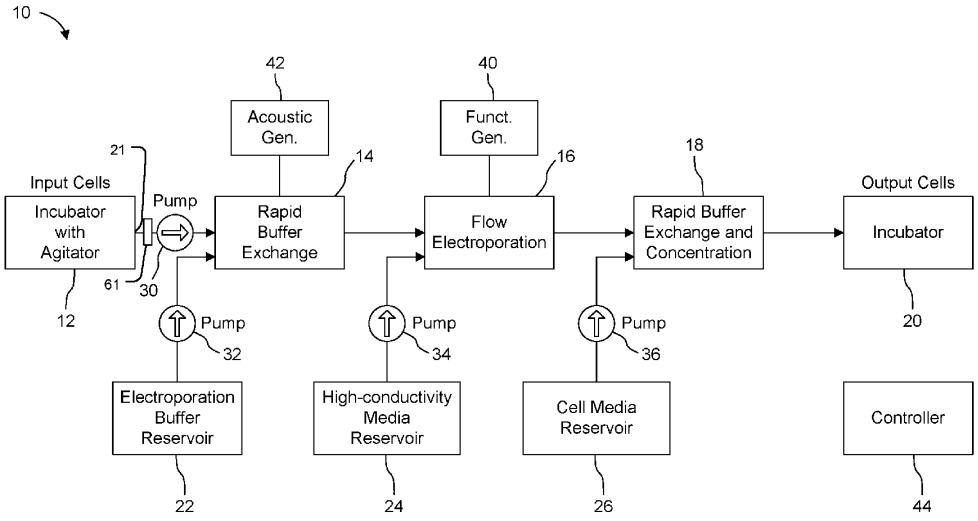


FIG. 1

(57) Abstract: Transfer of genetic and other materials to cells is conducted in a hands-free, automated, high throughput, continuous process. A system using a microfluidic hydrodynamic sheath flow configuration includes arrangements for pushing cells from side streams containing a cell culture medium to a central stream containing an electroporation buffer. Electroporation can be conducted in an assembly in which two or more microfluidic channels are provided in a parallel configuration and in which various layers can be stacked together to form a laminate type structure.

WO 2020/047504 A3

[Continued on next page]

(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))*

— *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))*

(88) **Date of publication of the international search report:**
09 April 2020 (09.04.2020)