

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
13 August 2020 (13.08.2020)



(10) International Publication Number
WO 2020/161674 A1

(51) International Patent Classification:

B01F 13/00 (2006.01) *B01F 5/06* (2006.01)
B01F 5/10 (2006.01) *B01F 11/02* (2006.01)
B01F 13/08 (2006.01)

(21) International Application Number:

PCT/IB2020/050979

(22) International Filing Date:

07 February 2020 (07.02.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/803,233 08 February 2019 (08.02.2019) US
2023366 24 June 2019 (24.06.2019) NL

(71) Applicant: **ILLUMINA, INC.** [US/US]; 5200 Illumina Way, SAN DIEGO, California 92122 (US).

(72) Inventors: **KARUNAKARAN, Aathavan**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **RIVAL, Arnaud**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **AGAH, Ali**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **ABEILLE, Fabien**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **BARNARD, Steven**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **CIESLA, Craig**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **VENKATESAN, Murali**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **GHEISSARI, Pargol**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **WANG, Jennifer**; 5200 Illumina Way, SAN DIEGO, California 92122 (US). **DEHLINGER, Dietrich**; 5200 Illumina Way, SAN DIEGO, California 92122 (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,

(54) Title: METHODS AND DEVICES FOR MIXING IN A MICROFLUIDIC SYSTEM

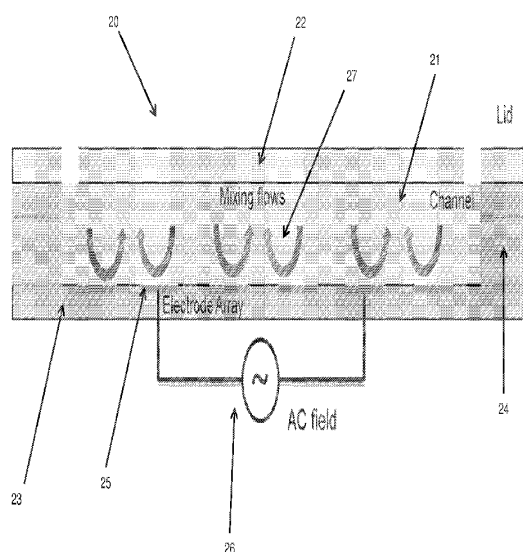


FIG. 2

(57) Abstract: A method for reducing sequencing by synthesis cycle time using a microfluidic device is provided. The microfluidic device comprises a flow cell (20) having an inlet port, an outlet port, and a flow channel (21) extending between the inlet port and the outlet port, wherein the flow channel receives an analyte of interest and one or more reagents for analyzing and detecting molecules. To aid in the acceleration of the reactions, the microfluidic device comprises a mixing device to increase the rates of diffusion of the reagents from the fluid bulk to an active surface of the flow cell. The mixing device comprises at least one of an electrothermal mixing device, an active mechanical mixing device, and a vibrational mixing device.

[Continued on next page]

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, 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))*
- *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))*