

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
25 July 2019 (25.07.2019)



(10) International Publication Number
WO 2019/143564 A1

- (51) International Patent Classification:
G02B 21/18 (2006.01) *G02B 27/42* (2006.01)
- (21) International Application Number:
PCT/US2019/013504
- (22) International Filing Date:
14 January 2019 (14.01.2019)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
62/618,059 16 January 2018 (16.01.2018) US
2020620 20 March 2018 (20.03.2018) NL
- (71) Applicant: **ILLUMINA, INC.** [US/US]; 5200 Illumina Way, San Diego, CA 92122 (US).
- (72) Inventors: **NEWMAN, Peter, Clarke**; c/o Illumina, Inc., 5200 Illumina Way, San Diego, CA 92122 (US). **CONDELLO, Danilo**; c/o Illumina, Inc., 5200 Illumina Way, San Diego, CA 92122 (US). **LU, Shaoping**; c/o Illumina, Inc., 5200 Illumina Way, San Diego, CA 92122 (US). **PRINCE, Simon**; c/o Illumina, Inc., 5200 Illumina Way, San Diego, CA 92122 (US). **SIU, Merek, C.**; c/o Illumina, Inc., 5200 Illumina Way, San Diego, CA 92122 (US). **HONG, Stanley, S.**; c/o Illumina, Inc., 5200 Illumina Way, San Diego, CA 92122 (US). **LIU, Aaron**; c/o Illumina, Inc., 5200 Illumina Way, San Diego, CA 92122 (US).
- (74) Agent: **MIKRUT, Jeffrey, J.** et al.; Illumina, Inc., 5200 Illumina Way, San Diego, CA 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: PATTERN ANGLE SPATIAL SELECTION STRUCTURED ILLUMINATION IMAGING

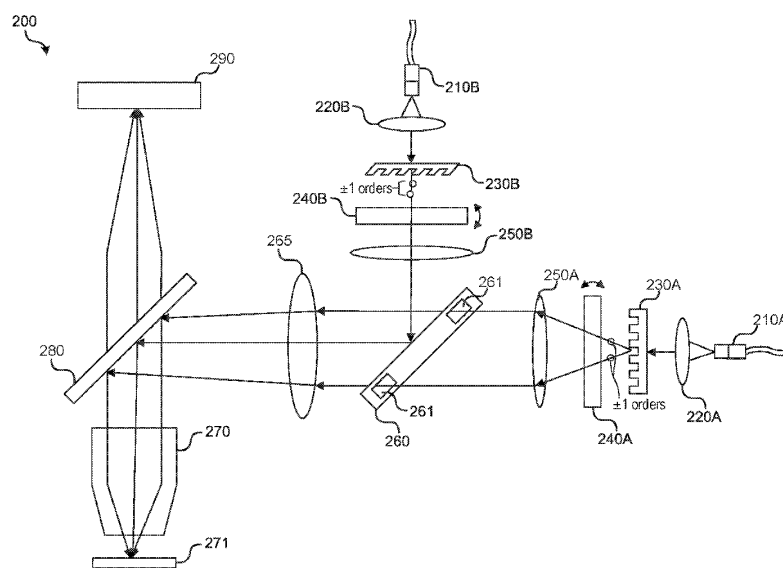


FIG. 2

(57) Abstract: The disclosure provides for structured illumination microscopy (SIM) imaging systems. In one set of implementations, a SIM imaging system may be implemented as a multi-arm SIM imaging system, whereby each arm of the system includes a light emitter and a beam splitter (e.g., a transmissive diffraction grating) having a specific, fixed orientation with respect to the system's optical axis. In a second set of implementations, a SIM imaging system may be implemented as a multiple beam splitter slide SIM imaging system, where one linear motion stage is mounted with multiple beam splitters having a corresponding, fixed orientation with respect to the system's optical axis. In a third set of implementations, a SIM imaging system may be implemented as a pattern angle spatial selection SIM imaging system, whereby a fixed two-dimensional diffraction grating is used in combination with a spatial filter wheel to project one-dimensional fringe patterns on a sample.

[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, 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))