

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

(19) World Intellectual Property
Organization

International Bureau

(43) International Publication Date
19 August 2021 (19.08.2021)



(10) International Publication Number
WO 2021/162639 A1

(51) International Patent Classification:

G01N 33/569 (2006.01) G01N 21/64 (2006.01)
G01N 21/63 (2006.01)

(21) International Application Number:

PCT/SG2021/050072

(22) International Filing Date:

11 February 2021 (11.02.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10202001326W 13 February 2020 (13.02.2020) SG

(71) Applicant: **AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH** [SG/SG]; 1 Fusionopolis Way, #20-10, Connexis North Tower, Singapore 138632 (SG).

(72) Inventors: **SUTARLIE, Laura**; c/o Institute of Materials Research and Engineering, 2 Fusionopolis Way, #08-03, Innovis, Singapore 138634 (SG). **SU, Xiaodi**; c/o Institute of Materials Research and Engineering, 2 Fusionopolis Way, #08-03, Innovis, Singapore 138634 (SG). **XU, Yang**; c/o Institute of Materials Research and Engineering, 2 Fusionopolis Way, #08-03, Innovis, Singapore 138634 (SG). **CHEE, Heng Li**; c/o Institute of Materials Research and Engineering, 2 Fusionopolis Way, #08-03, Innovis, Singapore 138634 (SG). **OW, Sian Yang**; c/o Institute of Materials Research and Engineering, 2 Fusionopolis Way, #08-03, Innovis, Singapore 138634 (SG).

novis, Singapore 138634 (SG). **SATO, Takuya**; c/o Kikkoman Singapore R&D Laboratory Pte Ltd, 11 Biopolis Way, #05-01 Helios, Singapore 138667 (SG).

(74) Agent: **DAVIES COLLISON CAVE ASIA PTE. LTD.**;

10 Collyer Quay #07-01, Ocean Financial Centre, Singapore 049315 (SG).

(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, IT, 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).

(54) Title: NANOPARTICLE SOLUTIONS, KITS, DEVICES AND METHODS OF USE THEREOF

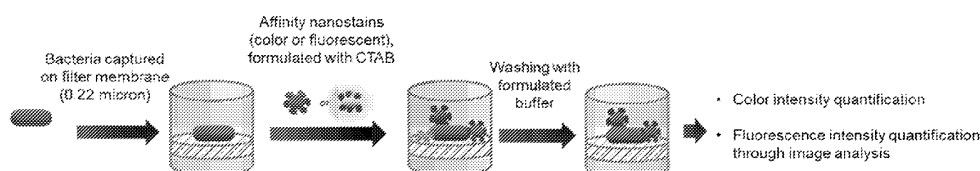


Figure 12

(57) Abstract: The present invention relates to an aqueous nanoparticle solution comprising plasmonic and/or fluorescent nanoparticle functionalised with an affinity probe and a first ionic surfactant, a kit and a device comprising said nanoparticle solution, and a method of quantifying bacterial cells in a sample comprising steps of passing the sample in a liquid form and the aqueous solution through the porous substrate such that the bacterial cells in the sample is trapped on the porous substrate and bind to the nanoparticles via affinity binding, and can be quantified by a colorimetric and/or fluorescence output emitted from the nanoparticle bound to the bacterial cells. In specific embodiments, the nanoparticles include gold nanoparticles, silver nanoparticles, and CdSe/CdS core/shell nanorods; the affinity probe includes protein, sugar binding protein, peptide, and aptamer such as *Griphonia simplicifolia* II (GSM) lectin, BSA, and Antibac2 (AB2) aptamer; and the first ionic surfactant includes cetrimonium bromide (CTAB), cetrimonium chloride (CTAC) and sodium dodecyl sulfate (SDS).

[Continued on next page]

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*
— *in black and white; the international application as filed
contained color or greyscale and is available for download
from PATENTSCOPE*