



(51) International Patent Classification:

C12N 15/10 (2006.01) C12N 15/09 (2006.01)
C12Q 1/6876 (2018.01) A61K 35/17 (2015.01)
C12Q 1/6881 (2018.01)

(21) International Application Number:

PCT/US2022/080915

(22) International Filing Date:

05 December 2022 (05.12.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/286,507 06 December 2021 (06.12.2021) US
63/382,860 08 November 2022 (08.11.2022) US

(71) Applicant: THE BOARD OF TRUSTEES OF THE LELAND STANFORD JUNIOR UNIVERSITY [US/US];

Office of the General Counsel, Bldg 170, 3rd Flr, Main Quad, P.O. Box 20386, Stanford, CA 94305-2038 (US).

(72) Inventors: CHANG, Howard, Y.; c/o The Board of

Trustees of the Leland Stanford, Junior University, Office of the General Counsel, Bldg 170, 3rd Flr, Main Quad, P.O. Box 20386, Stanford, CA 94305-2038 (US). SATPATHY, Ansuman; Office of the General Counsel, Bldg 170, 3rd Flr, Main Quad, P.O. Box 20386, Stanford, CA 94305-2038 (US). YU, Bingfei; c/o The Board of Trustees of the Leland

Stanford, Junior University, Office of the General Counsel, Bldg 170, 3rd Flr, Main Quad, P.O. Box 20386, Stanford, CA 94305-2038 (US). SHI, Quanming; c/o The Board of Trustees of the Leland Stanford, Junior University, Office of the General Counsel, Bldg 170, 3rd Flr, Main Quad, P.O. Box 20386, Stanford, CA 94305-2038 (US).

(74) Agent: DANG, David, V. et al.; Mintz Levin Cohn Ferris Glovsky and Popeo, P.C., 3580 Carmel Mountain Road, Suite 300, San Diego, CA 92130-6768 (US).

(81) Designated States (unless otherwise indicated, for every

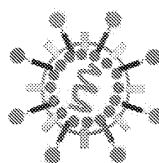
kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, 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, CV, 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,

(54) Title: METHODS AND COMPOSITIONS FOR DISCOVERY OF RECEPTOR-LIGAND SPECIFICITY BY ENGINEERED CELL ENTRY

Viral Display and Delivery platform



1. protein display
2. receptor-mediated entry
3. protein delivery
4. gene delivery



Surface displayed protein for recognition
(ligand, MHC-peptide, antibody etc)



Fusogen (viral fusion and entry in cells)



Viral protein fused with payload
(fluorescent protein, Cas9 etc)



single strand viral RNA
(genetic barcode, gene delivery etc)

FIG. 1A

(57) Abstract: The present disclosure relates to systems, methods and compositions for decoding ligand- receptor interactions, for delivering nucleic acids and proteins into target cells and for performing single cell multiomics. Disclosed are engineered lentiviruses displaying ligands that deliver cargo into target cells upon cognate receptor-ligand interaction. Also disclosed are compositions and methods including pMHC or antigen epitopes displaying lentiviruses for identifying pMHC/T-cell receptors and antigen/B-cell receptor interactions.

LV, MC, ME, 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))*
- *with sequence listing part of description (Rule 5.2(a))*