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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 April 2020 (23.04.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/081974 A1

(51) International Patent Classification:
A61K 9/51 (2006.01) *C12N 15/88* (2006.01)
A61K 38/17 (2006.01)

(21) International Application Number:
PCT/US2019/056997

(22) International Filing Date:
18 October 2019 (18.10.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/747,987 19 October 2018 (19.10.2018) US

(71) Applicant: **OHIO STATE INNOVATION FOUNDATION** [US/US]; 1524 North High Street, Columbus, Ohio 43201 (US).

(72) Inventors: **HIGUITA-CASTRO, Natalia**; 2165 Quarry Valley Road, Columbus, Ohio 43204 (US). **GALLEGO-PEREZ, Daniel**; 2165 Quarry Valley Road, Columbus, Ohio 43204 (US). **GHADIALI, Samir**; 2114 Ellington Road, Upper Arlington, Ohio 43210 (US). **ENGLERT, Joshua**; 8009 Millway Loop, Powell, Ohio 43065 (US). **SEN, Chandan**; c/o Ohio State Innovation Foundation, 1524 North High Street, Columbus, Ohio 43201 (US).

(74) Agent: **GILES, P., Brian**; Thomas Horstemeyer LLP, 3200 Windy Hill Road SE, Suite 1600E, Atlanta, Georgia 30339 (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.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH,

(54) Title: NANOCARRIERS FOR LUNG INFLAMMATION THERAPY

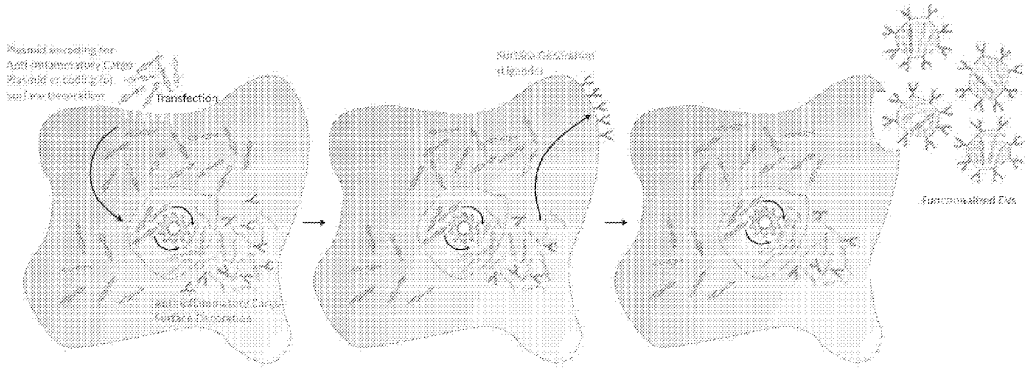


FIG. 1

(57) Abstract: Disclosed are lung-targeted extracellular vesicles (EVs) loaded with an anti-inflammatory cargo, as well as compositions, systems, and methods for making same. The disclosed EVs can contain a lung targeted ligand, such as a fusion protein containing a lung targeting moiety. Also disclosed is a composition comprising an EV containing the disclosed fusion protein. In some embodiments, the EV is loaded with an anti-inflammatory cargo. Also disclosed is an EV-producing cell engineered to produce the disclosed EVs. Also disclosed is a method for making the disclosed EVs that involves culturing the disclosed EV-producing cells under conditions suitable to produce EVs.

WO 2020/081974 A1

[Continued on next page]

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).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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))*