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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 August 2021 (12.08.2021)

WIPO | PCT

(10) International Publication Number
WO 2021/159118 A3

(51) International Patent Classification:
A61K 48/00 (2006.01) *A61K 39/12* (2006.01)
A61K 9/127 (2006.01) *A61K 39/00* (2006.01)
A61K 9/00 (2006.01) *A61K 38/00* (2006.01)
A61K 9/14 (2006.01) *C07H 21/04* (2006.01)

(21) International Application Number:
PCT/US2021/017149

(22) International Filing Date:
08 February 2021 (08.02.2021)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

62/971,834	07 February 2020 (07.02.2020)	US
63/058,463	29 July 2020 (29.07.2020)	US
63/130,581	24 December 2020 (24.12.2020)	US

(71) Applicant: **RNALMMUNE, INC.** [US/US]; 401 Professional Drive, Suite 280, Gaithersburg, MD 20879 (US).

(72) Inventors: **TANG, Shenggao**; c/o Rnalmmune, Inc., 401 Professional Drive, Suite 280, Gaithersburg, MD 20879 (US). **SHEN, Dong**; c/o Rnalmmune, Inc., 401 Professional Drive, Suite 280, Gaithersburg, MD 20879 (US). **LU, Chun**; c/o Rnalmmune, Inc., 401 Professional Drive, Suite 280, Gaithersburg, MD 20879 (US). **HE, Ziyang**; c/o Rnalmmune, Inc., 401 Professional Drive, Suite 280, Gaithersburg, MD 20879 (US). **HE, Jiaxi**; c/o Rnalmmune, Inc., 401 Professional Drive, Suite 280, Gaithersburg, MD 20879 (US). **LU, Patrick, Y.**; c/o Rnalmmune, Inc., 401 Professional Drive, Suite 280, Gaithersburg, MD 20879 (US).

(74) Agent: **BOOTH, Paul, M.** et al.; Edell, Shapiro & Finnan LLC, 9801 Washingtonian Blvd., Suite 750, Gaithersburg, MD 20878 (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, 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).

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))*

(88) Date of publication of the international search report:
28 October 2021 (28.10.2021)

WO 2021/159118 A3

(54) Title: COMPOSITION AND METHOD OF MRNA VACCINES AGAINST NOVEL CORONAVIRUS INFECTION

(57) Abstract: Compositions and methods are provided for potent mRNA vaccines for prevention and treatment of 2019 novel Coronavirus (2019-nCoV) infections. The compositions include a pharmaceutical composition containing one or more mRNA molecules encoding spike protein epitopes, including mutated epitopes, or mRNA cocktails that encode critical viral genes together with pharmaceutically acceptable polymeric nanoparticle carriers and liposomal nanoparticle carriers. Methods for stimulating system immune responses and treatment are provided, including subcutaneous, intraperitoneal and intramuscular injections.