



(51) International Patent Classification:

A01K 67/027 (2006.01) *C07K 14/11* (2006.01)
A61P 37/04 (2006.01) *C12N 5/0793* (2010.01)
C07K 14/00 (2006.01) *C12N 5/0797* (2010.01)

(21) International Application Number:

PCT/US2019/036559

(22) International Filing Date:

11 June 2019 (11.06.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/683,865 12 June 2018 (12.06.2018) US

(71) Applicant: **KENTUCKY BIOPROCESSING, INC.**

[US/US]: 401 North Main Street, c/o Reynolds-American Inc., Winston-Salem, North Carolina 27101 (US).

(72) Inventors: **BURDEN, Leigh**; 2033 Whispering Meadows

Drive, Owensboro, Kentucky 42301 (US). **HUME, Steven D.**; 3153 Wood Valley Point, Owensboro, Kentucky 42303

(US). **MORTON, Joshua**; 730 N. Peerless Rd., Evansville, Indiana 47712 (US). **POGUE, Greg**; 5817 Tributary Ridge

Road, Austin, Texas 78759 (US). **BRATCHER, Barry**; 2 Hilltop Drive, Owensboro, Kentucky 42303 (US). **HAY-**

DON, Hugh A.; 1 Pin Oak Lane, Louisville, Kentucky 40207 (US). **SIMPSON, Carrie A.**; 3214 Vierling Drive,

Evansville, Indiana 47715 (US). **PARTAIN, Nick**; 3868 Thresher Street, Owensboro, Kentucky 42301 (US).

(54) Title: VIRUS AND ANTIGEN PURIFICATION AND CONJUGATION

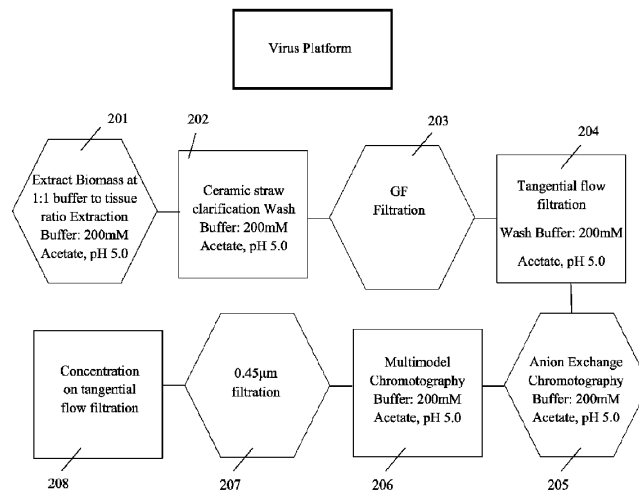


Figure 1

(57) **Abstract:** Disclosed herein are methods and exemplary compositions associated with virus purification, antigen purification, and conjugation of virus and proteins (e.g., antigen) to form vaccines for delivery of immunological and other therapeutic agents, exemplary aspects of which may include harvesting viral and antigenic substances from source organisms; a purification platform comprising chemical separation and size-difference separation for the removal of contaminants, debris and impurities from the viral and protein (e.g. antigenic, including influenza hemagglutinin antigens) substances, as well as their concentration and collection; and a conjugation platform providing activation of the virus at a pH that increases binding rate and binding propensity between the virus and the protein, wherein embodiments related to the conjugation platform include controlling the ratio of virus to protein.

[Continued on next page]

(74) **Agent:** HALL, Stephen C. et al.; Wyatt, Tarrant & Combs, LLP, 500 West Jefferson Street, Suite 2800, Louisville, Kentucky 40202 (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, 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))*