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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 December 2022 (15.12.2022)

WIPO | PCT

(10) International Publication Number
WO 2022/261213 A1

(51) International Patent Classification:
A61K 47/64 (2017.01) *A61K 47/69* (2017.01)

(21) International Application Number:
PCT/US2022/032683

(22) International Filing Date:
08 June 2022 (08.06.2022)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
63/208,385 08 June 2021 (08.06.2021) US

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(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, IQ, IR, IS, IT, JM, 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).

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))*

WO 2022/261213 A1

(54) **Title:** NANOPARTICLES FOR TARGETED NON-SURGICAL SPAYING AND NEUTERING

(57) **Abstract:** Nanoparticles and formulations for non-surgical sterilization are disclosed herein. The nanoparticles for non-surgical sterilization contains a cage, such as a zeolitic imidazolate framework ("ZIF"), a surface modifying agent, a targeting ligand, and an active agent. The surface modifying agent is attached to the outer surface of the cage and the targeting ligand is exposed to the surrounding environment. The active agent is encapsulated in the cage. The targeting ligand binds to a reproductive hormone or a receptor of a reproductive hormone. The active agents can be a ribosome inactivating protein, an apoptosis inducer, a hormone, a receptor ligand, or a nucleic acid, or a combination thereof, that inactivates the ovaries or testes. Uses for the nanoparticles and formulations incorporating the nanoparticles for sterilizing a subject in need thereof are also disclosed.