WHAT IS CLAIMED:

1. A nanoparticle comprising a positively-charged surface and an interior comprising (i) a core and (ii) at least two nucleic acid layers, wherein each nucleic acid layer is positioned between a cationic lipid bilayer, wherein the nanoparticle comprises RNA molecules encoding a SARS-CoV-2 protein.
2. The nanoparticle of claim 1, comprising at least three nucleic acid layers, each of which is positioned between a cationic lipid bilayer.
3. The nanoparticle of claim 2, comprising at least four nucleic acid layers, each of which is positioned between a cationic lipid bilayer.
4. The nanoparticle of claim 3, comprising five or more nucleic acid layers, each of which is positioned between a cationic lipid bilayer.
5. The nanoparticle of any one of claims 1-4, wherein the outermost layer of the nanoparticle comprises a cationic lipid bilayer.
6. The nanoparticle of any one of claims 1-5, wherein the surface comprises a plurality of hydrophilic moieties of the cationic lipid of the cationic lipid bilayer.
7. The nanoparticle of any one of claims 1-6, wherein the core comprises a cationic lipid bilayer.
8. The nanoparticle of any one of claims 1-7, wherein the core comprises less than about 0.5 wt% nucleic acid.
9. The nanoparticle of any one of claims 1-8, wherein the diameter of the nanoparticle is about 50 nm to about 250 nm in diameter, optionally, about 70 nm to about 200 nm in diameter.
10. The nanoparticle of any one of claims 1-9, comprising a zeta potential of about 40 mV to about 60 mV, optionally, about 45 mV to about 55 mV.
11. The nanoparticle of claim 10, comprising a zeta potential of about 50 mV.
12. The nanoparticle of any one of claims 1-11, comprising nucleic acid molecules and cationic lipid at a ratio of about 1 to about 5 to about 1 to about 20, optionally, about 1 to about 15 or about 1 to about 7.5.
13. The nanoparticle of any one of claims 1-12, wherein the cationic lipid is DOTAP or DOTMA.
14. The nanoparticle of any one of claims 1-13, wherein the nucleic acid molecules are RNA molecules.
15. The nanoparticle of claim 14, wherein the RNA molecules are mRNA.
16. The nanoparticle of any one of claims 1-15, wherein the mRNAs encode a SARS-CoV-2 Spike (S) protein or a fragment thereof.
17. The nanoparticle of claim 16, wherein the S protein comprises the amino acid sequence set forth in Figure 20.

18. The nanoparticle of any one of claims 1-17, wherein the mRNAs encode a SARS-CoV-2 membrane protein, envelope protein, or a nucleocapsid protein.
19. The nanoparticle of any one of claims 1-18, wherein the liposomes are prepared by mixing the nucleic acid molecules and the cationic lipid at a RNA: cationic lipid ratio of about 1 to about 5 to about 1 to about 20, optionally, about 1 to about 15.
20. A method of making a nanoparticle comprising a positively-charged surface and an interior comprising (i) a core and (ii) at least two nucleic acid layers, wherein each nucleic acid layer is positioned between a cationic lipid bilayer, wherein the nanoparticle comprises RNA molecules encoding a SARS-CoV-2 protein, said method comprising:

    (A) mixing nucleic acid molecules encoding a SARS-CoV-2 protein and liposomes at a nucleic acid: liposome ratio of about 1 to about 5 to about 1 to about 20, optionally, about 1 to about 15, to obtain a nucleic acid-coated liposomes, wherein the liposomes are made by a process of making liposomes comprising drying a lipid mixture comprising a cationic lipid and an organic solvent by evaporating the organic solvent under a vacuum; and

    (B) mixing the nucleic acid-coated liposomes with a surplus amount of liposomes.
21. The method of claim 20, wherein the lipid mixture comprises the cationic lipid and the organic solvent at a ratio of about 40 mg cationic lipid per mL organic solvent to about 60 mg cationic lipid per mL organic solvent, optionally, at a ratio of about 50 mg cationic lipid per mL organic solvent.
22. The method of claim 20 or claim 21, wherein the process of making liposomes further comprises rehydrating the lipid mixture with a rehydration solution to form a rehydrated lipid mixture and then agitating, resting, and sizing the rehydrated lipid mixture.
23. The method of claim 22, wherein sizing the rehydrated lipid mixture comprises sonicating, extruding and/or filtering the rehydrated lipid mixture.
24. The method of any one of claims 20-23, comprising the steps of Example 1.
25. The method of any one of claims 20-24, wherein the nanoparticle has a zeta potential of about 40 mV to about 60 mV, optionally, about 45 mV to about 55 mV.
26. The method of any one of claims 20-25, wherein the core of the nanoparticle comprises less than about 0.5 wt% nucleic acid and/or the core comprises a cationic lipid bilayer
27. The method of any one of claims 20-27, wherein the outermost layer of the nanoparticle comprises a cationic lipid bilayer and/or the surface of the nanoparticle comprises a plurality of hydrophilic moieties of the cationic lipid of the cationic lipid bilayer.
28. The method of any one of claims 20-27, wherein the mRNAs encode a SARS-CoV-2 Spike (S) protein or a fragment thereof.
29. The method of claim 28, wherein the S protein comprises the amino acid sequence set forth in Figure 20.
30. The method of any one of the claims 20-29, wherein the mRNAs encode a SARS-CoV-2 membrane protein, envelope protein, or a nucleocapsid protein.

31. A nanoparticle made by the method of any one of claims 20-30.
32. A cell comprising a nanoparticle as described in any one of claims 1-19 or according to claim 31.
33. The cell of claim 32, which is an antigen presenting cell (APC), optionally, a dendritic cell (DC).
34. A population of cells, wherein at least 50% of the population are cells according to claim 32 or claim 33.
35. A pharmaceutical composition comprising a plurality of nanoparticles according to any one of claims 1-19 or claim 31 and a pharmaceutically acceptable carrier, diluent, or excipient.
36. The pharmaceutical composition of claim 35, wherein the composition comprises about 10^{10} nanoparticles per mL to about 10^{15} nanoparticles per mL, optionally about 10^{12} nanoparticles ± 10% per mL.
37. A method of inducing an immune response against a SARS-CoV-2 virus in a subject, the method comprising administering to the subject the pharmaceutical composition of claim 35 or claim 36.
38. The method of claim 37, wherein the nucleic acid molecules are mRNA.
39. The method of claim 37 or claim 38, wherein the composition is systemically administered to the subject.
40. The method of claim 39, wherein the composition is administered intravenously.
41. The method of any one of claims 37-40, wherein the pharmaceutical composition is administered in an amount which is effective to activate dendritic cells (DCs) in the subject.
42. The method of any one of claims 37-41, wherein the immune response is a T cell-mediated immune response.
43. The method of any one of claims 37-42, wherein the immune response is a humoral immune response.
44. The method of claim 43, wherein the immune response comprises production of antibodies to a SARS CoV-2 protein.
45. The method of any one of claims 37-43, wherein a single dose of the composition comprises about 0.00050 mg/kg to about 1.5 mg/kg of nucleic acid.
46. The method of claim 45, wherein the nucleic acid is encapsulated into about 0.008 mg/kg to about 1.5 mg/kg of liposome material.
47. The method of claim 45 or claim 46, wherein a single dose of composition comprises about 0.000625 mg/kg to about 0.08 mg/kg nucleic acid.
48. The method of claim 47, wherein a single dose of composition comprises about 0.000625 mg/kg of mRNA, about 0.00125 mg/kg mRNA, about 0.0025 mg/kg mRNA, about 0.005 mg/kg mRNA, about 0.01 mg/kg mRNA, about 0.02 mg/kg mRNA, about 0.04 mg/kg mRNA, or about 0.08 mg/kg mRNA.
49. The method of any one of claims 37-48, comprising administering to the subject multiple doses of pharmaceutical composition over a treatment period of about 18 months.
50. The method of claim 49, comprising administering (a) an initial set of doses of the pharmaceutical composition, each administration separated by two weeks, followed by (b) a subsequent set of doses of pharmaceutical composition, each administered once per month.

51. The method of claim 50, wherein the initial set of three doses are administered over an initial treatment period of about four weeks, and the subsequent set of doses are administered over a subsequent treatment period of about 12 months.