

WHAT IS CLAIMED IS:

1. A method of detecting COVID-19 infection with SARS-CoV-2 in a subject comprising:
 - (a) contacting a sample from said subject with an antibody or antibody fragment having clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively; and
 - (b) detecting SARS-CoV-2 in said sample by binding of said antibody or antibody fragment to a SARS-CoV-2 antigen in said sample.
2. The method of claim 1, wherein said sample is a body fluid.
3. The method of claims 1-2, wherein said sample is blood, sputum, tears, saliva, mucous or serum, semen, cervical or vaginal secretions, amniotic fluid, placental tissues, urine, exudate, transudate, tissue scrapings or feces.
4. The method of claims 1-3, wherein detection comprises ELISA, RIA, lateral flow assay or western blot.
5. The method of claims 1-4, further comprising performing steps (a) and (b) a second time and determining a change in SARS-CoV-2 antigen levels as compared to the first assay.
6. The method of claims 1-5, wherein the antibody or antibody fragment is encoded by clone-paired variable sequences as set forth in Table 1.
7. The method of claims 1-5, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, 90% or 95% identity to clone-paired variable sequences as set forth in Table 1.
8. The method of claims 1-5, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having 100% identity to clone-paired sequences as set forth in Table 1.

9. The method of claims 1-5, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
10. The method of claims 1-5, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having at least 70%, 80%, 90% or 95% identity to clone-paired sequences from Table 2.
11. The method of claims 1-10, wherein said antibody or antibody fragment binds to a SARS-CoV-2 surface spike protein.
12. The method of claims 1-11, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
13. A method of treating a subject infected with SARS-CoV-2 or reducing the likelihood of infection of a subject at risk of contracting SARS-CoV-2, comprising delivering to said subject an antibody or antibody fragment having clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively.
14. The method of claim 13, the antibody or antibody fragment is encoded by clone-paired light and heavy chain variable sequences as set forth in Table 1.
15. The method of claims 13-14, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, 90% or 95% identity to clone-paired sequences from Table 1.
16. The method of claim 13, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
17. The method of claim 13, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having at least 70%, 80% or 90% identity to clone-paired sequences from Table 2.

18. The method of claim 13, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 2.
19. The method of claims 13-18, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
20. The method of claims 13-19, wherein said antibody is an IgG, or a recombinant IgG antibody or antibody fragment comprising an Fc portion mutated to alter (eliminate or enhance) FcR interactions, to increase half-life and/or increase therapeutic efficacy, such as a LALA, LALA PG, N297, GASD/ALIE, DHS, YTE or LS mutation or glycan modified to alter (eliminate or enhance) FcR interactions such as enzymatic or chemical addition or removal of glycans or expression in a cell line engineered with a defined glycosylating pattern.
21. The method of claims 13-18, wherein said antibody is a chimeric antibody or a bispecific antibody.
22. The method of claims 13-21, wherein said antibody or antibody fragment binds to a SARS-CoV-2 surface spike protein.
23. The method of claim 13-22, wherein said antibody or antibody fragment is administered prior to infection or after infection.
24. The method of claim 13-23, wherein said subject is of age 60 or older, is immunocompromised, or suffers from a respiratory and/or cardiovascular disorder.
25. The method of claim 13-24, wherein delivering comprises antibody or antibody fragment administration, or genetic delivery with an RNA or DNA sequence or vector encoding the antibody or antibody fragment.

26. A monoclonal antibody, wherein the antibody or antibody fragment is characterized by clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively.
27. The monoclonal antibody of claim 26, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences according to clone-paired sequences from Table 1.
28. The monoclonal antibody of claim 26, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, 90%, or 95% identity to clone-paired sequences from Table 1.
29. The monoclonal antibody of claim 26, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
30. The monoclonal antibody of claim 26, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having at least 70%, 80%, 90%, or 95% identity to clone-paired sequences from Table 2.
31. The monoclonal antibody of claims 26-30, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
32. The monoclonal antibody of claims 26-30, wherein said antibody is a chimeric antibody, or is a bispecific antibody.
33. The monoclonal antibody of claims 26-32, wherein said antibody is an IgG, or a recombinant IgG antibody or antibody fragment comprising an Fc portion mutated to alter (eliminate or enhance) FcR interactions, to increase half-life and/or increase therapeutic efficacy, such as a LALA, LALA PG, N297, GASD/ALIE, DHS, YTE or LS mutation or glycan modified to alter (eliminate or enhance) FcR interactions such as enzymatic or chemical addition or removal of glycans or expression in a cell line engineered with a defined glycosylating pattern.

34. The monoclonal antibody of claims 26-33, wherein said antibody or antibody fragment binds to a SARS-CoV-2 antigen such as a surface spike protein.
35. The monoclonal antibody of claims 26-34, wherein said antibody is an intrabody.
36. A hybridoma or engineered cell encoding an antibody or antibody fragment wherein the antibody or antibody fragment is characterized by clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively.
37. The hybridoma or engineered cell of claim 36, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences according to clone-paired sequences from Table 1.
38. The hybridoma or engineered cell of claim 36, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, or 90% identity to clone-paired variable sequences from Table 1.
39. The hybridoma or engineered cell of claim 36, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 95% identity to clone-paired variable sequences from Table 1.
40. The hybridoma or engineered cell of claim 36, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
41. The hybridoma or engineered cell of claim 36, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, or 90% identity to clone-paired variable sequences from Table 2.
42. The hybridoma or engineered cell of claim 36, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 2.

43. The hybridoma or engineered cell of claims 36-42, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
44. The hybridoma or engineered cell of claim 36-43, wherein said antibody is a chimeric antibody, a bispecific antibody, or an intrabody.
45. The hybridoma or engineered cell of claim 36-43, wherein said antibody is an IgG, or a recombinant IgG antibody or antibody fragment comprising an Fc portion mutated to alter (eliminate or enhance) FcR interactions, to increase half-life and/or increase therapeutic efficacy, such as a LALA, LALA PG, N297, GASD/ALIE, DHS, YTE or LS mutation or glycan modified to alter (eliminate or enhance) FcR interactions such as enzymatic or chemical addition or removal of glycans or expression in a cell line engineered with a defined glycosylating pattern.
46. The hybridoma or engineered cell of claim 36-45, wherein said antibody or antibody fragment binds to a SARS-CoV-2 surface spike protein.
47. A vaccine formulation comprising one or more antibodies or antibody fragments characterized by clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively.
48. The vaccine formulation of claim 47, wherein at least one of said antibodies or antibody fragments is encoded by light and heavy chain variable sequences according to clone-paired sequences from Table 1.
49. The vaccine formulation of claim 47, wherein at least one of said antibodies or antibody fragments is encoded by light and heavy chain variable sequences having at least 70%, 80%, or 90% identity to clone-paired sequences from Table 1.
50. The vaccine formulation of claim 47, wherein at least one of said antibodies or antibody fragments is encoded by light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 1.

51. The vaccine formulation of claim 47, wherein at least one of said antibodies or antibody fragments comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
52. The vaccine formulation of claim 47, wherein at least one of said antibodies or antibody fragments comprises light and heavy chain variable sequences having at least 70%, 80%, 90% or 95% identity to clone-paired sequences from Table 2.
53. The vaccine formulation of claims 47-52, wherein at least one of said antibody fragments is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
54. The vaccine formulation of claims 47-52, wherein at least one of said antibodies is a chimeric antibody, is bispecific antibody or an intrabody.
55. The vaccine formulation of claims 47-54, wherein said antibody is an IgG, or a recombinant IgG antibody or antibody fragment comprising an Fc portion mutated to alter (eliminate or enhance) FcR interactions, to increase half-life and/or increase therapeutic efficacy, such as a LALA, LALA PG, N297, GASD/ALIE, DHS YTE or LS mutation or glycan modified to alter (eliminate or enhance) FcR interactions such as enzymatic or chemical addition or removal of glycans or expression in a cell line engineered with a defined glycosylating pattern.
56. The vaccine formulation of claims 47-55, wherein said antibody or antibody fragment binds to a SARS-CoV-2 surface spike protein.
57. A vaccine formulation comprising one or more expression vectors encoding a first antibody or antibody fragment according to claims 26-34.
58. The vaccine formulation of claim 57, wherein said expression vector(s) is/are Sindbis virus or VEE vector(s).
59. The vaccine formulation of claims 57-58, formulated for delivery by needle injection, jet injection, or electroporation.

60. The vaccine formulation of claim 57, further comprising one or more expression vectors encoding for a second antibody or antibody fragment, such as a distinct antibody or antibody fragment of claims 26-34.
61. A method of protecting the health of a subject of age 60 or older, an immunocompromised, subject or a subject suffering from a respiratory and/or cardiovascular disorder that is infected with or at risk of infection with SARS-CoV-2 comprising delivering to said subject an antibody or antibody fragment having clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively.
62. The method of claim 61, the antibody or antibody fragment is encoded by clone-paired light and heavy chain variable sequences as set forth in Table 1.
63. The method of claim 61-62, the antibody or antibody fragment is encoded by clone-paired light and heavy chain variable sequences having at least 95% identity to as set forth in Table 1.
64. The method of claim 61-62, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, or 90% identity to clone-paired sequences from Table 1.
65. The method of claim 61, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
66. The method of claim 61, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having at least 70%, 80% or 90% identity to clone-paired sequences from Table 2.
67. The method of claim 61, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 2.

68. The method of claims 61-67, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
69. The method of claims 61-68, wherein said antibody is an IgG, or a recombinant IgG antibody or antibody fragment comprising an Fc portion mutated to alter (eliminate or enhance) FcR interactions, to increase half-life and/or increase therapeutic efficacy, such as a LALA, LALA PG, N297, GASD/ALIE, DHS, YTE or LS mutation or glycan modified to alter (eliminate or enhance) FcR interactions such as enzymatic or chemical addition or removal of glycans or expression in a cell line engineered with a defined glycosylating pattern.
70. The method of claims 61-67 wherein said antibody is a chimeric antibody or a bispecific antibody.
71. The method of claim 61-70, wherein said antibody or antibody fragment is administered prior to infection or after infection.
72. The method of claim 61-71, wherein said antibody or antibody fragment binds to a SARS-CoV-2 surface spike protein.
73. The method of claim 61-72, wherein delivering comprises antibody or antibody fragment administration, or genetic delivery with an RNA or DNA sequence or vector encoding the antibody or antibody fragment.
74. The method of claim 61, wherein the antibody or antibody fragment improves the subject's respiration as compared to an untreated control.
75. The method of claim 61, wherein the antibody or antibody fragment reduces viral load as compared to an untreated control.

76. A method of determining the antigenic integrity, correct conformation and/or correct sequence of a SARS-CoV-2 surface spike protein comprising:
- (a) contacting a sample comprising said antigen with a first antibody or antibody fragment having clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively; and
 - (b) determining antigenic integrity, correct conformation and/or correct sequence of said antigen by detectable binding of said first antibody or antibody fragment to said antigen.
77. The method of claim 76, wherein said sample comprises recombinantly produced antigen.
78. The method of claim 76, wherein said sample comprises a vaccine formulation or vaccine production batch.
79. The method of claims 76-78, wherein detection comprises ELISA, RIA, western blot, a biosensor using surface plasmon resonance or biolayer interferometry, or flow cytometric staining.
80. The method of claims 76-79, wherein the first antibody or antibody fragment is encoded by clone-paired variable sequences as set forth in Table 1.
81. The method of claims 76-79, wherein said first antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, or 90% identity to clone-paired variable sequences as set forth in Table 1.
82. The method of claims 76-79 wherein said first antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 95% identity to clone-paired sequences as set forth in Table 1.
83. The method of claims 76-79, wherein said first antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.

84. The method of claims 76-79, wherein said first antibody or antibody fragment comprises light and heavy chain variable sequences having at least 70%, 80% or 90% identity to clone-paired sequences from Table 2.
85. The method of claims 76-79, wherein said first antibody or antibody fragment comprises light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 2.
86. The method of claims 76-85, wherein the first antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
87. The method of claims 76-86, further comprising performing steps (a) and (b) a second time to determine the antigenic stability of the antigen over time.
88. The method of claims 76-87, further comprising:
- (c) contacting a sample comprising said antigen with a second antibody or antibody fragment having clone-paired heavy and light chain CDR sequences from Tables 3 and 4, respectively; and
 - (d) determining antigenic integrity of said antigen by detectable binding of said second antibody or antibody fragment to said antigen.
89. The method of claim 88, wherein the second antibody or antibody fragment is encoded by clone-paired variable sequences as set forth in Table 1.
90. The method of claim 89, wherein said second antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 70%, 80%, or 90% identity to clone-paired variable sequences as set forth in Table 1.
91. The method of claim 89, wherein said second antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 95% identity to clone-paired sequences as set forth in Table 1.

92. The method of claims 89, wherein said second antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
93. The method of claim 89, wherein said second antibody or antibody fragment comprises light and heavy chain variable sequences having at least 70%, 80% or 90% identity to clone-paired sequences from Table 2.
94. The method of claim 89, wherein said second antibody or antibody fragment comprises light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 2.
95. The method of claim 89, wherein the second antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
96. The method of claim 89, further comprising performing steps (c) and (d) a second time to determine the antigenic stability of the antigen over time.
97. A human monoclonal antibody or antibody fragment, or hybridoma or engineered cell producing the same, wherein said antibody binds to a SARS-CoV-2 surface spike protein.