

WHAT IS CLAIMED IS: CLAIMS

1. A composition comprising a single domain antigen binding domain (sdABD) that binds to the Spike protein having SEQ ID NO:300 or the sequence described in Figure 17A, wherein said sdABD comprises, from N- to C-terminal, FR1-vhCDR1-FR2-vhCDR2-FR3-vhCDR3-FR, wherein said vhhCDR1, vhhCDR2 and said vhhCDR3 is selected from the sets depicted in Figure 13, Figure 15 and Figure 25.

2. A composition according to claim 1 wherein said vhCDR1 has a sequence GI(I/Y/W/F/V/L)FGRNA, said vhCDR2 has a sequence TRR(G/H/Y/G/Q)SITY and said vhCDR3 has a sequence AADPA(S/V/L/I/T)PA(P/F/W/Y/L/V)GDY.

~~3. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:5, said vhCDR2 has SEQ ID NO:6, and vhCDR3 has SEQ ID NO:7.~~

~~4. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:8, said vhCDR2 has SEQ ID NO:9, and vhCDR3 has SEQ ID NO:10.~~

~~5. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:11, said vhCDR2 has SEQ ID NO:12, and vhCDR3 has SEQ ID NO:13.~~

~~6. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:14, said vhCDR2 has SEQ ID NO:15, and vhCDR3 has SEQ ID NO:16.~~

~~7. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:17, said vhCDR2 has SEQ ID NO:18, and vhCDR3 has SEQ ID NO:19.~~

~~8. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:20, said vhCDR2 has SEQ ID NO:21, and vhCDR3 has SEQ ID NO:22.~~

9. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:23, said ~~vh~~CDR2 has SEQ ID NO:24, and ~~vh~~CDR3 has SEQ ID NO:25.

10. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:26, said ~~vh~~CDR2 has SEQ ID NO:27, and ~~vh~~CDR3 has SEQ ID NO:28.

11. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:29, said ~~vh~~CDR2 has SEQ ID NO:30, and ~~vh~~CDR3 has SEQ ID NO:31.

12. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:32, said ~~vh~~CDR2 has SEQ ID NO:33, and ~~vh~~CDR3 has SEQ ID NO:34.

13. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:35, said ~~vh~~CDR2 has SEQ ID NO:36, and ~~vh~~CDR3 has SEQ ID NO:37.

14. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:38, said ~~vh~~CDR2 has SEQ ID NO:39, and ~~vh~~CDR3 has SEQ ID NO:40.

15. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:41, said ~~vh~~CDR2 has SEQ ID NO:42, and ~~vh~~CDR3 has SEQ ID NO:43.

16. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:44, said ~~vh~~CDR2 has SEQ ID NO:45, and ~~vh~~CDR3 has SEQ ID NO:46.

17. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:47, said ~~vh~~CDR2 has SEQ ID NO:48, and ~~vh~~CDR3 has SEQ ID NO:49.

18. A composition according to claim 1 wherein said ~~vh~~CDR1 has SEQ ID NO:50, said ~~vh~~CDR2 has SEQ ID NO:51, and ~~vh~~CDR3 has SEQ ID NO:52.

~~19. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:53, said vhCDR2 has SEQ ID NO:54, and vhCDR3 has SEQ ID NO:55.~~

~~20. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:56, said vhCDR2 has SEQ ID NO:57, and vhCDR3 has SEQ ID NO:58.~~

~~21. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:59, said vhCDR2 has SEQ ID NO:60, and vhCDR3 has SEQ ID NO:61.~~

~~22. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:62, said vhCDR2 has SEQ ID NO:63, and vhCDR3 has SEQ ID NO:64.~~

~~23. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:65, said vhCDR2 has SEQ ID NO:66, and vhCDR3 has SEQ ID NO:67.~~

~~24. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:68, said vhCDR2 has SEQ ID NO:69, and vhCDR3 has SEQ ID NO:70.~~

~~25. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:71, said vhCDR2 has SEQ ID NO:72, and vhCDR3 has SEQ ID NO:73.~~

~~26. A composition according to claim 1 wherein said vhCDR1 has SEQ ID NO:74, said vhCDR2 has SEQ ID NO:75, and vhCDR3 has SEQ ID NO:76.~~

~~27. A composition according to any of claims 3 to 25 wherein the framework sequences of said sdABD have SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3 and SEQ ID NO:4.~~

~~283.~~ A composition according to ~~any of claims 1 to 25~~ claim 1 or 2 wherein said composition further comprises an half-life extension domain covalently attached to said sdABD using a domain linker.

~~29.~~ A composition according to ~~claim 26~~ wherein said half-life extension domain is selected from the group consisting of an anti-human serum albumin (HSA)-sdABD and all or part of HSA.

~~304.~~ A composition comprising a MASC fusion protein that binds to the Spike protein having SEQ ID NO: 300 or the sequence described in Figure 17A, wherein said MASC fusion protein comprises, from N- to C-terminal, FR1-vhCDR1-FR2-vhCDR2-FR3-vhCDR3-FR-domain linker-FR1-vhCDR1-FR2-vhCDR2-FR3-vhCDR3-FR, wherein said vhhCDR1, vhhCDR2 and said vhhCDR3 is selected from the sets depicted in Figure 13, Figure 15 and Figure 25.

~~315.~~ A composition according to ~~claim 304~~ wherein said vhCDR1 has a sequence GI(I/Y/W/F/V/L)FGRNA, said vhCDR2 has a sequence TRR(G/H/Y/G/Q)SITY and said vhCDR3 has a sequence AADPA(S/V/L/I/T)PA(P/F/W/Y/L/V)GDY.

~~32.~~ A composition according to ~~claim 30~~ wherein said vhCDR1 has SEQ ID NO:5, said vhCDR2 has SEQ ID NO:6, and vhCDR3 has SEQ ID NO:7.

~~33.~~ A composition according to ~~claim 30~~ wherein said vhCDR1 has SEQ ID NO:8, said vhCDR2 has SEQ ID NO:9, and vhCDR3 has SEQ ID NO:10.

~~34.~~ A composition according to ~~claim 30~~ wherein said vhCDR1 has SEQ ID NO:11, said vhCDR2 has SEQ ID NO:12, and vhCDR3 has SEQ ID NO:13.

~~35.~~ A composition according to ~~claim 30~~ wherein said vhCDR1 has SEQ ID NO:14, said vhCDR2 has SEQ ID NO:15, and vhCDR3 has SEQ ID NO:16.

~~36. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:17, said vhCDR2 has SEQ ID NO:18, and vhCDR3 has SEQ ID NO:19.~~

~~37. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:20, said vhCDR2 has SEQ ID NO:21, and vhCDR3 has SEQ ID NO:22.~~

~~38. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:23, said vhCDR2 has SEQ ID NO:24, and vhCDR3 has SEQ ID NO:25.~~

~~39. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:26, said vhCDR2 has SEQ ID NO:27, and vhCDR3 has SEQ ID NO:28.~~

~~40. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:29, said vhCDR2 has SEQ ID NO:30, and vhCDR3 has SEQ ID NO:31.~~

~~41. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:32, said vhCDR2 has SEQ ID NO:33, and vhCDR3 has SEQ ID NO:34.~~

~~42. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:35, said vhCDR2 has SEQ ID NO:36, and vhCDR3 has SEQ ID NO:37.~~

~~43. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:38, said vhCDR2 has SEQ ID NO:39, and vhCDR3 has SEQ ID NO:40.~~

~~44. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:41, said vhCDR2 has SEQ ID NO:42, and vhCDR3 has SEQ ID NO:43.~~

~~45. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:44, said vhCDR2 has SEQ ID NO:45, and vhCDR3 has SEQ ID NO:46.~~

~~46. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:47, said vhCDR2 has SEQ ID NO:48, and vhCDR3 has SEQ ID NO:49.~~

~~47. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:50, said vhCDR2 has SEQ ID NO:51, and vhCDR3 has SEQ ID NO:52.~~

~~48. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:53, said vhCDR2 has SEQ ID NO:54, and vhCDR3 has SEQ ID NO:55.~~

~~49. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:56, said vhCDR2 has SEQ ID NO:57, and vhCDR3 has SEQ ID NO:58.~~

~~50. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:59, said vhCDR2 has SEQ ID NO:60, and vhCDR3 has SEQ ID NO:61.~~

~~51. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:62, said vhCDR2 has SEQ ID NO:63, and vhCDR3 has SEQ ID NO:64.~~

~~52. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:65, said vhCDR2 has SEQ ID NO:66, and vhCDR3 has SEQ ID NO:67.~~

~~53. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:68, said vhCDR2 has SEQ ID NO:69, and vhCDR3 has SEQ ID NO:70.~~

~~54. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:71, said vhCDR2 has SEQ ID NO:72, and vhCDR3 has SEQ ID NO:73.~~

~~55. A composition according to claim 30 wherein said vhCDR1 has SEQ ID NO:74, said vhCDR2 has SEQ ID NO:75, and vhCDR3 has SEQ ID NO:76.~~

~~56. A composition according to any of claims 32 to 54 wherein the framework sequences of said sdABD have SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3 and SEQ ID NO:4.~~

~~57.~~ 576. A composition according to ~~any of claims 30 to 54~~ claim 4 or 5 wherein said composition further comprises an half-life extension domain covalently attached to said sdABD using a domain linker.

~~58. A composition according to claim 55 wherein said half life extension domain is selected from the group consisting of an anti-human serum albumin (HSA) sdABD and all or part of HSA.~~

~~59.~~ 597. A composition comprising a MASC fusion protein that binds to the Spike protein having SEQ ID NO: 300 or the sequence described in Figure 17A, wherein said MASC fusion protein comprises, from N- to C-terminal, FR1-vhCDR1-FR2-vhCDR2-FR3-vhCDR3-FR-domain linker-FR1-vhCDR1-FR2-vhCDR2-FR3-vhCDR3-FR-domain linker-FR1-vhCDR1-FR2-vhCDR2-FR3-vhCDR3-FR, wherein said vhhCDR1, vhhCDR2 and said vhhCDR3 is selected from the sets depicted in Figure 13, Figure 15 and Figure 25.

~~60.~~ 608. A composition according to claim ~~59~~ wherein said vhCDR1 has a sequence GI(I/Y/W/F/V/L)FGRNA, said vhCDR2 has a sequence TRR(G/H/Y/G/Q)SITY and said vhCDR3 has a sequence AADPA(S/V/L/I/T)PA(P/F/W/Y/L/V)GDY.

~~61. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:5, said vhCDR2 has SEQ ID NO:6, and vhCDR3 has SEQ ID NO:7.~~

~~62. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:8, said vhCDR2 has SEQ ID NO:9, and vhCDR3 has SEQ ID NO:10.~~

~~63. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:11, said vhCDR2 has SEQ ID NO:12, and vhCDR3 has SEQ ID NO:13.~~

~~64. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:14, said vhCDR2 has SEQ ID NO:15, and vhCDR3 has SEQ ID NO:16.~~

~~65. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:17, said vhCDR2 has SEQ ID NO:18, and vhCDR3 has SEQ ID NO:19.~~

~~66. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:20, said vhCDR2 has SEQ ID NO:21, and vhCDR3 has SEQ ID NO:22.~~

~~67. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:23, said vhCDR2 has SEQ ID NO:24, and vhCDR3 has SEQ ID NO:25.~~

~~68. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:26, said vhCDR2 has SEQ ID NO:27, and vhCDR3 has SEQ ID NO:28.~~

~~69. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:29, said vhCDR2 has SEQ ID NO:30, and vhCDR3 has SEQ ID NO:31.~~

~~70. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:32, said vhCDR2 has SEQ ID NO:33, and vhCDR3 has SEQ ID NO:34.~~

~~71. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:35, said vhCDR2 has SEQ ID NO:36, and vhCDR3 has SEQ ID NO:37.~~

~~72. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:38, said vhCDR2 has SEQ ID NO:39, and vhCDR3 has SEQ ID NO:40.~~

~~73. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:41, said vhCDR2 has SEQ ID NO:42, and vhCDR3 has SEQ ID NO:43.~~

~~74. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO44, said vhCDR2 has SEQ ID NO45, and vhCDR3 has SEQ ID NO:46.~~

~~75. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:47, said vhCDR2 has SEQ ID NO:48, and vhCDR3 has SEQ ID NO:49.~~

~~76. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:50, said vhCDR2 has SEQ ID NO:51, and vhCDR3 has SEQ ID NO:52.~~

~~77. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:53, said vhCDR2 has SEQ ID NO:54, and vhCDR3 has SEQ ID NO:55.~~

~~78. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:56, said vhCDR2 has SEQ ID NO:57, and vhCDR3 has SEQ ID NO:58.~~

~~79. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:59, said vhCDR2 has SEQ ID NO:60, and vhCDR3 has SEQ ID NO:61.~~

~~80. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO62 said vhCDR2 has SEQ ID NO:63, and vhCDR3 has SEQ ID NO:64.~~

~~81. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:65, said vhCDR2 has SEQ ID NO:66, and vhCDR3 has SEQ ID NO:67.~~

~~82. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:68, said vhCDR2 has SEQ ID NO:69, and vhCDR3 has SEQ ID NO:70.~~

~~83. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:71, said vhCDR2 has SEQ ID NO:72, and vhCDR3 has SEQ ID NO:73.~~

~~84. A composition according to claim 59 wherein said vhCDR1 has SEQ ID NO:74, said vhCDR2 has SEQ ID NO:75, and vhCDR3 has SEQ ID NO:76.~~

~~85. A composition according to any of claims 61 to 83 wherein the framework sequences of said sdABD have SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3 and SEQ ID NO:4.~~

~~86.~~ 869. A composition according to ~~any of claims 59 to 83~~ claim 7 or 8 wherein said composition further comprises an half-life extension domain covalently attached to said sdABD using a domain linker.

~~87. A composition according to claim 84 wherein said half life extension domain is selected from the group consisting of an anti human serum albumin (HSA) sdABD and all or part of HSA.~~

~~88~~10. A nucleic acid encoding the composition of any of claims 1 to 29, ~~30 to 58 and 59 to 87~~.

~~89~~11. An expression vector comprising the nucleic acid of claim ~~88~~10.

~~90~~12. A host cell comprising the expression vector of claim ~~60~~11.

~~9413.~~ A method of making a composition according to any of claims 1 to 29, ~~30 to 58 and 59 to 87~~ comprising culturing the host cell of claim ~~90~~12 under conditions whereby said composition is expressed and recovering said composition.

14. The composition of any of claims 1 to 9 for use in therapy.

~~9215.~~ A method of treating or preventing an infection by SARS-CoV2 virus comprising administering to a human Use of the composition of any of claims 1 to 29, 30 to 58 and 59 to 87, thereby treating or preventing said infection in the manufacture of a medicament for treating or preventing an infection by SARS-CoV2 virus.

~~9316.~~ A method of neutralizing the SARS-CoV2 virus comprising administering to a human Use of the composition of any of claims 1 to 29, 30 to 58 and 59 to 87, thereby neutralizing said virus in the manufacture of a medicament for neutralizing the SARS-CoV2 virus.

~~94.~~ A method according to claim 92 or 93 wherein said administration comprises intravenous administration.

~~95.~~ A method according to claim 92 or 93 wherein said administration comprises nasal administration.

~~96.~~ A method according to claim 92 or 93 wherein said administration comprises inhalation.

~~97.~~ A method according to claim 96 wherein said inhalation is achieved using a nebulizer.

~~9817.~~ A lyophilized composition comprising a MASC protein of any of claims 1 to 29, ~~30 to 58 and 59 to 87~~.

~~9918.~~ A composition comprising an antigen binding domain (ABD) that binds to the trimeric Spike protein, each monomer of the Spike protein having SEQ ID NO: 300 or the

sequence described in Figure 17A, wherein said ABD binds to a first epitope of a first monomer and binds to a second epitope of a second monomer.

~~100~~19. A composition according to claim ~~99~~18 where said first epitope comprises residues 446, 447, 449, 453, 455, 456, 483-486, 489-490, 493-496, 498, 501, and 505 within the ACE2 binding region of the SC2 spike RBD and said second epitope comprises residues 342, 343, 367, 371-375, 404, 436-441.

~~101~~20. A composition comprising an ABD that binds to the trimeric Spike protein, each monomer of the Spike protein having SEQ ID NO: 300 or the sequence described in Figure 17A, wherein said binding results in the RBD of said Spike protein being locked into the non-extended position.