

CLAIMS

1. An antibody or antibody fragment comprising clone-paired heavy and light CDR sequences from Tables 3 and 4, respectively.
- 5 2. The antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences according to clone-paired sequences from Table 1.
- 10 3. The antibody or antibody fragment of claim 1, 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.
- 15 4. The antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 1.
- 20 5. The antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
- 25 6. The antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having 70%, 80% or 90% identity to clone-paired sequences from Table 2.
- 30 7. The antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having 95% identity to clone-paired sequences from Table 2.
8. The antibody or antibody fragment of claims 1-7, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.

9. The antibody or antibody fragment of claims 1-7, wherein said antibody is a chimeric antibody.
10. The antibody or antibody fragment of claims 1-9, wherein said antibody is an IgG.
- 5 11. The antibody or antibody fragment of claims 1-10, wherein said antibody or antibody fragment further comprises a cell penetrating peptide and/or is an intrabody.
- 10 12. The antibody or fragment of claims 1-11, wherein said antibody or antibody fragment is a human antibody.
13. The antibody or fragment of claims 1-11, wherein said antibody or antibody fragment is a humanized antibody.
- 15 14. A method of treating a subject having cancer 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.
- 20 15. The method of claim 14, the antibody or antibody fragment is encoded by clone-paired light and heavy chain variable sequences as set forth in Table 1.
16. The method of claim 14-15, 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.
- 25 17. The method of claim 14-15, the antibody or antibody fragment is encoded by clone-paired light and heavy chain variable sequences having at least 95% identity to clone-paired sequences as set forth in Table 1.
- 30 18. The method of claim 14, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.

19. The method of claim 14, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having 70%, 80% or 90% identity to clone-paired sequences from Table 2.
- 5 20. The method of claim 14, encoded by light and heavy chain variable sequences having 95% identity to clone-paired sequences from Table 2.
21. The method of claims 14-20, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv
10 fragment.
22. The method of claims 14-21, wherein said antibody is an IgG.
23. The method of claims 14-20, wherein said antibody is a chimeric antibody.
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24. The method of claim 14-23, 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.
- 20 25. 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.
26. The hybridoma or engineered cell of claim 25, wherein said antibody or antibody
25 fragment is encoded by light and heavy chain variable sequences according to clone-paired sequences from Table 1.
27. The hybridoma or engineered cell of claim 25, wherein said antibody or antibody
30 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.
28. The hybridoma or engineered cell of claim 25, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having 95% identity to clone-paired variable sequences from Table 1.

29. The hybridoma or engineered cell of claim 25, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
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30. The hybridoma or engineered cell of claim 25, 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.
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31. The hybridoma or engineered cell of claim 25, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having 95% identity to clone-paired sequences from Table 2.
32. The hybridoma or engineered cell of claims 25-31, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
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33. The hybridoma or engineered cell of claims 25-32, wherein said antibody is a chimeric antibody.
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34. The hybridoma or engineered cell of claims 25-32, wherein said antibody is an IgG.
35. The hybridoma or engineered cell of claim 25-34, wherein said antibody or antibody fragment further comprises a cell penetrating peptide and/or is an intrabody.
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36. 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.
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37. The vaccine formulation of claim 36, wherein at least one antibody or antibody fragment is encoded by light and heavy chain variable sequences according to clone-paired sequences from Table 1.

38. The vaccine formulation of claim 36, wherein at least one 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.
- 5 39. The vaccine formulation of claim 38, wherein at least one antibody or antibody fragment is encoded by light and heavy chain variable sequences having at least 95% identity to clone-paired sequences from Table 1.
- 10 40. The vaccine formulation of claim 36, wherein at least one antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
- 15 41. The vaccine formulation of claim 36, wherein at least one antibody or antibody fragment comprises light and heavy chain variable sequences having 95% identity to clone-paired sequences from Table 2.
- 20 42. The vaccine formulation of claims 36-41, wherein at least one antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
43. The vaccine formulation of claims 36-41, wherein at least one antibody is a chimeric antibody.
- 25 44. The vaccine formulation of claims 36-43, wherein at least one antibody is an IgG.
45. The vaccine formulation of claims 36-44, wherein at least one antibody or antibody fragment further comprises a cell penetrating peptide and/or is an intrabody.
- 30 46. A method of detecting a PD-L1 or PD-L2 expressing cell 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 a PD-L1 or PD-L2 expressing cell in said sample by binding of said antibody or antibody fragment to a cell in said sample.

47. The method of claim 46, wherein said sample is a body fluid.
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48. The method of claims 46-47, wherein said sample is tissue sample.
49. The method of claims 46-47, wherein detection comprises ELISA, RIA or Western blot.
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50. The method of claims 46-49, further comprising performing steps (a) and (b) a second time and determining a change in orthopoxvirus antigen levels as compared to the first assay.
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51. The method of claims 46-50, wherein the antibody or antibody fragment is encoded by clone-paired variable sequences as set forth in Table 1.
52. The method of claims 46-50, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having 70%, 80%, or 90% identity to clone-paired variable sequences as set forth in Table 1.
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53. The method of claims 46-50, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences having 95% identity to clone-paired sequences as set forth in Table 1.
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54. The method of claims 46-50, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to clone-paired sequences from Table 2.
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55. The method of claims 46-50, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having 70%, 80% or 90% identity to clone-paired sequences from Table 2.

56. The method of claims 46-50, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences having 95% identity to clone-paired sequences from Table 2.
- 5 57. The method of claims 46-56, wherein the antibody fragment is a recombinant scFv (single chain fragment variable) antibody, Fab fragment, F(ab')₂ fragment, or Fv fragment.
58. The method of claims 46-57, wherein said cell is a cancer cell.
- 10 59. The method of claim 58, wherein the cancer cell is a lymphoma cell, a breast cancer cell, or renal cell carcinoma cell.
60. The method of claims 46-57, wherein said cell is a cell associated with immune suppression.
- 15 61. The method of claim 60, wherein said cell associated with immune suppression is a non-cancerous cell in the tumor microenvironment.
- 20 62. The method of claim 61, wherein said non-cancerous cell in the tumor microenvironment is a stromal or endothelial cell.
63. A method of treating immune suppression in a tumor microenvironment 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.
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