SUMMARY

[0007a] In one aspect, the present disclosure refers to an antibody or antibody fragment comprising ~~clone paired~~ heavy CDR and light CDR sequences: ~~from~~

Antibody	CDRH1 (SEQ ID NO:)	CDRH2 (SEQ ID NO:)	CDRH3 (SEQ ID NO:)
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2$_4$	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924 BiPDL4-4$_4$	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1$_3$	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1$_2$	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1$_4$	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2$_4$	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4$_4$	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5$_4$	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	CDRL1 (SEQ ID NO:)	CDRL2 (SEQ ID NO:)	CDRL3 (SEQ ID NO:)
37468 BiPDL3-3$_4$	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3$_4$	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1$_4$	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2$_4$	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)

27924 BiPDL4-4$_4$	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1$_3$	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1$_2$	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)
37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2$_4$	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4$_4$	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively.

[0007b] In another aspect, the present disclosure refers to use of an antibody or antibody fragment having ~~clone paired~~ heavy CDR and light chain CDR sequences~~: from~~

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2$_4$	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924 BiPDL4-4$_4$	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1$_3$	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1$_2$	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1$_4$	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2$_4$	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)

37475 BiPDL3-4$_4$	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5$_4$	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	**CDRL1 (SEQ ID NO:)**	**CDRL2 (SEQ ID NO:)**	**CDRL3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3$_4$	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1$_4$	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2$_4$	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924 BiPDL4-4$_4$	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1$_3$	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1$_2$	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)
37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2$_4$	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4$_4$	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively, in the manufacture of a medicament for treating a subject having cancer, wherein the antibody or antibody fragment is for delivery to said subject

[0007c] In yet another aspect, the present disclosure refers to a hybridoma or engineered cell encoding an antibody or antibody fragment wherein the antibody or antibody fragment is characterized by ~~clone-paired~~ heavy chain CDR and light chain CDR sequences: ~~from~~

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**

37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2$_4$	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4$_4$	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively.

[0007d] In yet another aspect, the present disclosure refers to a vaccine formulation comprising one or more antibodies or antibody fragments characterized by ~~clone-paired~~ heavy chain CDR and light chain CDR sequences~~: from~~

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2$_4$	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924 BiPDL4-4$_4$	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1$_3$	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1$_2$	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1$_4$	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2$_4$	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4$_4$	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5$_4$	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	CDRL1 (SEQ ID NO:)	CDRL2 (SEQ ID NO:)	CDRL3 (SEQ ID NO:)
37468 BiPDL3-3$_4$	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3$_4$	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1$_4$	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2$_4$	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924 BiPDL4-4$_4$	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1$_3$	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1$_2$	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)
37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2$_4$	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4$_4$	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively.

[0007e] In yet another aspect, the present disclosure refers to 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 chain CDR and light chain CDR sequences from

Antibody	CDRH1 (SEQ ID NO:)	CDRH2 (SEQ ID NO:)	CDRH3 (SEQ ID NO:)
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)

37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, 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.

[0007f] In yet another aspect, the present disclosure refers to use of an antibody or antibody fragment having ~~clone-paired~~ heavy chain CDR and light chain CDR sequences from:

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2$_4$	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924 BiPDL4-4$_4$	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1$_3$	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
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37464 BiPDL3-1$_4$	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
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37475 BiPDL3-4$_4$	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5$_4$	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	**CDRL1 (SEQ ID NO:)**	**CDRL2 (SEQ ID NO:)**	**CDRL3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3$_4$	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)

CLAIMS

1. An antibody or antibody fragment comprising ~~clone-paired~~ heavy CDR and light CDR sequences: ~~from~~

Antibody	CDRH1 (SEQ ID NO:)	CDRH2 (SEQ ID NO:)	CDRH3 (SEQ ID NO:)
37468 BiPDL3-3_4	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3_4	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1_4	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2_4	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924 BiPDL4-4_4	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1_3	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1_2	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1_4	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2_4	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4_4	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5_4	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	CDRL1 (SEQ ID NO:)	CDRL2 (SEQ ID NO:)	CDRL3 (SEQ ID NO:)
37468 BiPDL3-3_4	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)

27907 BiPDL4-3_4	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1_4	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2_4	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924 BiPDL4-4_4	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1_3	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1_2	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)
37464 BiPDL3-1_4	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2_4	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4_4	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5_4	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively.

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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7

27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9

27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**

27907 Heavy BiPDL4-3_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6

27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody ~~Clone~~	Variable Sequence Region	SEQ ID NO:
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5

27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13

20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22

21680 Heavy BiPDL3-1$_3$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1$_3$	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1$_2$	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1$_2$	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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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~~

Antibody ~~Clone~~	**Variable Sequence**	**SEQ ID NO:**

37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1$_3$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1$_3$	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1$_2$	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1$_2$	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63

37464 Light BiPDL3-1$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15

27869 Light BiPDL4-1_4	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2_4	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2_4	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4_4	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4_4	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1_3	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1_3	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1_2	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1_2	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1_4	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2_4	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69

37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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8. The antibody or antibody fragment according to any one 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 according to any one of claims 1-7, wherein said antibody is a chimeric antibody.

10. The antibody or antibody fragment according to any one of claims 1-9, wherein said antibody is an IgG.

11. The antibody or antibody fragment according to any one of claims 1-10, wherein said antibody or antibody fragment further comprises a cell penetrating peptide and/or is an intrabody.

12. The antibody or fragment according to any one of claims 1-11, wherein said antibody or antibody fragment is a human antibody.

13. The antibody or fragment according to any one of claims 1-11, wherein said antibody or antibody fragment is a humanized antibody.

14. Use of an antibody or antibody fragment having ~~clone paired~~ heavy CDR and light chain CDR sequences~~: from~~

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)

27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2$_4$	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924 BiPDL4-4$_4$	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1$_3$	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1$_2$	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1$_4$	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2$_4$	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4$_4$	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5$_4$	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	**CDRL1 (SEQ ID NO:)**	**CDRL2 (SEQ ID NO:)**	**CDRL3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3$_4$	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1$_4$	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2$_4$	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924	RASHSVVSSYLA	GASSRED	VQFGWWPPRT

BiPDL4-4$_4$	(54)	(55)	(56)
21680 BiPDL3-1$_3$	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1$_2$	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)
37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2$_4$	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4$_4$	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively, in the manufacture of a medicament for treating a subject having cancer, wherein the antibody or antibody fragment is for delivery to said subject.

15. The use of claim 14, the antibody or antibody fragment is encoded by ~~clone~~ paired light and heavy chain variable sequences~~ as set forth in~~:

~~Clone~~ Antibody	Variable Sequence Region	SEQ ID NO:
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8

27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10

21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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16. The use of claim ~~14-15~~14 or 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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7

27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9

27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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17. The use of claim ~~14-15~~14 or 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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**

27907 Heavy BiPDL4-3_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6

27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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18. The use of claim 14, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to ~~clone paired~~ sequences: ~~from~~

~~Clone~~ Antibody	Variable Sequence	SEQ ID NO:
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1$_3$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1$_3$	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1$_2$	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1$_2$	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26

37464 Heavy BiPDL3-1$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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19. The use 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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20

27869 Heavy BiPDL4-1_4	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1_4	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2_4	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2_4	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4_4	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4_4	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1_3	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1_3	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1_2	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1_2	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1_4	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2_4	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66

37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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20. The use of claim 14, ~~encoded by~~ comprising light and heavy chain variable sequences having 95% identity to ~~clone paired~~ sequences: ~~from~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22

21680 Heavy BiPDL3-1_3	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1_3	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1_2	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1_2	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1_4	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2_4	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4_4	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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21. The use of according to any one 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 fragment.

22. The use of according to any one of claims 14-21, wherein said antibody is an IgG.

23. The use of according to any one of claims 14-20, wherein said antibody is a chimeric antibody.

24. The use of according to any one of claims 14-23, wherein the delivery comprises the antibody or antibody fragment to be administered to the subject, or genetic delivery with an RNA or DNA sequence or vector encoding the antibody or antibody fragment.

25. A hybridoma or engineered cell encoding an antibody or antibody fragment wherein the antibody or antibody fragment is characterized by ~~clone-paired~~ heavy chain CDR and light chain CDR sequences~~: from~~

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3_4	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3_4	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1_4	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2_4	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924 BiPDL4-4_4	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1_3	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1_2	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1_4	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2_4	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4_4	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477	GSLSGYPWS	ETDVSGWTDYNPSLKS	ARDGRRMGTPSFDI

BiPDL3-5$_4$	(84)	(85)	(86)

and from

Antibody	**CDRL1 (SEQ ID NO:)**	**CDRL2 (SEQ ID NO:)**	**CDRL3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3$_4$	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1$_4$	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2$_4$	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924 BiPDL4-4$_4$	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1$_3$	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1$_2$	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)
37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2$_4$	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4$_4$	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively.

26. The hybridoma or engineered cell of claim 25, wherein said antibody or antibody fragment is encoded by light and heavy chain variable sequences according to ~~clone-paired~~ sequences: ~~from~~

Antibody ~~Clone~~	Variable Sequence Region	SEQ ID NO:
27907 Heavy BiPDL4-3_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6

27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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27. 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~~

Antibody ~~Clone~~	Variable Sequence Region	SEQ ID NO:
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5

27893 Light BiPDL4-2_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1_3	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1_3	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1_2	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13

20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4

27893 Heavy BiPDL4-2_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1_3	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1_3	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12

20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17

27893 Light BiPDL4-2_4	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4_4	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4_4	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1_3	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1_3	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1_2	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1_2	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1_4	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2_4	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4_4	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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30. The hybridoma or engineered cell of claim 25, wherein said antibody or antibody fragment ~~is encoded by~~ comprises light and heavy chain variable sequences having at least 70%, 80%, or 90% identity to ~~clone paired~~ variable sequences~~: from~~

Antibody~~Clone~~	Variable Sequence	SEQ ID NO:
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1$_3$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1$_3$	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1$_2$	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25

20786 Light BiPDL2-1$_2$	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19

27907 Light BiPDL4-3_4	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1_4	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1_4	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2_4	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2_4	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4_4	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4_4	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1_3	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1_3	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1_2	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1_2	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1_4	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66

BiPDL3-2$_4$		
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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32. The hybridoma or engineered cell according to any one 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.

33. The hybridoma or engineered cell according to any one of claims 25-32, wherein said antibody is a chimeric antibody.

34. The hybridoma or engineered cell according to any one of claims 25-32, wherein said antibody is an IgG.

35. The hybridoma or engineered cell according to any one of claims 25-34, wherein said antibody or antibody fragment further comprises a cell penetrating peptide and/or is an intrabody.

36. A vaccine formulation comprising one or more antibodies or antibody fragments characterized by ~~clone-paired~~ heavy chain CDR and light chain CDR sequences~~: from~~

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893	FTFDEYGMH	VIGYDGLNKYYADSVKG	ARAGIEYSYAYTDY

BiPDL4-2_4	(30)	(31)	(32)
27924 BiPDL4-4_4	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1_3	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1_2	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1_4	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2_4	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4_4	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5_4	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	**CDRL1 (SEQ ID NO:)**	**CDRL2 (SEQ ID NO:)**	**CDRL3 (SEQ ID NO:)**
37468 BiPDL3-3_4	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3_4	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1_4	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2_4	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924 BiPDL4-4_4	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1_3	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1_2	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)

37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2$_4$	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4$_4$	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5$_4$	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively.

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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3

27869 Light BiPDL4-1_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1_3	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11

21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8

27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10

21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7

27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9

27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67

37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1$_3$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1$_3$	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1$_2$	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1$_2$	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63

37464 Light BiPDL3-1$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15

27869 Light BiPDL4-1_4	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2_4	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2_4	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4_4	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4_4	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1_3	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1_3	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1_2	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1_2	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1_4	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2_4	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69

37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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42. The vaccine formulation according to any one 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 according to any one of claims 36-41, wherein at least one antibody is a chimeric antibody.

44. The vaccine formulation according to any one of claims 36-43, wherein at least one antibody is an IgG.

45. The vaccine formulation according to any one of claims 36-44, wherein at least one antibody or antibody fragment further comprises a cell penetrating peptide and/or is an intrabody.

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 chain CDR and light chain CDR sequences from

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893 BiPDL4-2$_4$	FTFDEYGMH (30)	VIGYDGLNKYYADSVKG (31)	ARAGIEYSYAYTDY (32)
27924	FTFSAYLMH	AIGYDGMNKYYADSVKG	ARAGIEYSYAYTDY

BiPDL4-4$_4$	(36)	(37)	(38)
21680 BiPDL3-1$_3$	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1$_2$	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1$_4$	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2$_4$	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4$_4$	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5$_4$	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	**CDRL1 (SEQ ID NO:)**	**CDRL2 (SEQ ID NO:)**	**CDRL3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3$_4$	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1$_4$	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2$_4$	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924 BiPDL4-4$_4$	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1$_3$	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1$_2$	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)
37464 BiPDL3-1$_4$	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)

37465 BiPDL3-2_4	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4_4	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5_4	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, 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.

48. The method according to any one of claims 46-47, wherein said sample is tissue sample.

49. The method according to any one of claims 46-47, wherein detection comprises ELISA, RIA or Western blot.

50. The method according to any one of claims 46-49, further comprising performing steps (a) and (b) a second time and determining a change in orthopoxvirus antigen ~~levels~~ binding as compared to ~~the first~~ a previous assay.

51. The method according to any one of claims 46-50, wherein the antibody or antibody fragment is encoded by ~~clone paired~~ variable sequences~~: as set forth in~~

Antibody ~~Clone~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7

27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9

27924 Light BiPDL4-4$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1$_3$	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1$_3$	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1$_2$	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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52. The method according to any one 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~~

Antibody ~~**Clone**~~	**Variable Sequence Region**	**SEQ ID NO:**

27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5
27893 Light BiPDL4-2$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6

27924 Heavy BiPDL4-4_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1_3	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1_3	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1_2	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13
20786 Light BiPDL2-1_2	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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53. The method according to any one 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~~

Antibody ~~**Clone**~~	**Variable Sequence Region**	**SEQ ID NO:**
27907 Heavy BiPDL4-3$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	7
27907 Light BiPDL4-3$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCGCCAGGGCCGCCGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTATGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTTGAGATCAAA	8
27869 Heavy BiPDL4-1$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	3
27869 Light BiPDL4-1$_4$	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGTTCGTTTACAGCA GCGACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCACCAGGAAAACTGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTCTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	4
27893 Heavy BiPDL4-2$_4$	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGGTCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCGATGAGT ATGGCATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGTTATAGGGTATGATGGACTGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	5

27893 Light BiPDL4-2_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTAACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCAGCCAGCAGGGCCAACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTTCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	6
27924 Heavy BiPDL4-4_4	CAGGTGCAGCTGGTGGAGTCTGGGGGAGGCGTGATCCAGCCTGGGAG GTCCCTGAGACTCTCCTGTGCAGCGTCTGGATTCACCTTCAGTGCGT ATCTTATGCACTGGGTCCGCCAGGCTCCAGGCAAGGGGCTGGAGTGG GTGGCAGCTATAGGTTATGATGGAATGAATAAATACTATGCAGACTC CGTGAAGGGCCGATTCACCATCTCCAGAGACAATTCCAAGAACACGC TGTATCTGCAAATGAACAGCCTGAGAGCCGAGGACACGGCGGTGTAC TACTGCGCCAGAGCTGGAATAGAATACAGCTACGCCTATACTGATTA CTGGGGACAGGGTACATTGGTCACCGTCTCCTCA	9
27924 Light BiPDL4-4_4	GAAATTGTGTTGACGCAGTCTCCAGGCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCACAGTGTTGTCAGCA GCTACTTAGCCTGGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTC CTCATCTATGGTGCATCCAGCAGGGAAGACGGCATCCCAGACAGGTT CAGTGGCAGTGGGTCTGGGACAGACTTCACTCTCACCATCAGCAGAC TGGAGCCTGAAGATTTTGCAGTGTATTACTGTGTGCAGTTCGGATGG TGGCCTCCTAGGACTTTCGGCGGAGGGACCAAGGTGGAGATCAAA	10
21680 Heavy BiPDL3-1_3	CAAGTACAATTACAACAGTGGGGAGCTGGTTTATTAAAGCCTTCAGA AACTTTAAGTTTGACCTGTGCTGTTTACGGTGGATCATTATCTGGTT ATCCTTGGTCTTGGATTCGTCAACCACCAGGCAAAGGATTGGAGTGG ATCGGTGAGACAGACGTGTCAGGCTGGACTGACTACAATCCAAGTTT AAAATCCAGGGTTACTATCTCCGTAGACACGTCCAAGAACCAGTTCT CCCTGAAGCTGAGTTCTGTGACCGCCGCAGACACGGCGGTGTACTAC TGCGCCAGAGACGGCAGAAGGATGGGTACCCCTTCATTCGACATATG GGGCCAGGGTACAATGGTCACCGTCTCCTCA	11
21680 Light BiPDL3-1_3	GACATCCAGTTGACCCAGTCTCCATCTTCCGTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGTCGGGCGAGTCAGGGTATTAGCAGCT GGTTAGCCTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTATGCTGCATCAAGTTTGCAAAGTGGGGTCCCATCAAGGTTCAG CGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGC AGCCTGAAGATTTTGCAACTTATTACTGTCAGCAGTACGTCTACTTC CCTCCTACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	12
20786 Heavy BiPDL2-1_2	CAGGTGCAGCTGGTGCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGTC CTCGGTGAAGGTCTCCTGCAAGGCTTCTGGAGGCACCTTCAGCAGCT GGTTGATCAGCTGGGTGCGACAGGCCCCTGGACAAGGGCTTGAGTGG ATGGGAGGGATCATCCCTATCCTGGGTACAGCACGGTACGCACAGAA GTTCCAGGGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAG CCTACATGGAGCTGAGCAGCCTGAGATCTGAGGACACGGCGGTGTAC TACTGCGCCAGAGTGTACAGAGCTGCTTCTTGGTTTGATCCCTGGGG ACAGGGTACATTGGTCACCGTCTCCTCA	13

20786 Light BiPDL2-1$_2$	GACATCCAGATGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGG AGACAGAGTCACCATCACTTGCCAGGCGAGTCAGGACATTAGCAACT ATTTAAATTGGTATCAGCAGAAACCAGGGAAAGCCCCTAAGCTCCTG ATCTACGATGCATCCAATTTGGAAACAGGGGTCCCATCAAGGTTCAG TGGAAGTGGATCTGGGACAGATTTTACTTTCACCATCAGCAGCCTGC AGCCTGAAGATATTGCAACATATTACTGTCAGCAGCCCTTCCACCTC ATCACTTTTGGCGGAGGGACCAAGGTTGAGATCAAA	14

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54. The method according to any one of claims 46-50, wherein said antibody or antibody fragment comprises light and heavy chain variable sequences according to ~~clone paired~~ sequences: ~~from~~

Antibody~~Cl~~ ~~one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22

21680 Heavy BiPDL3-1$_3$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1$_3$	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1$_2$	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1$_2$	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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55. The method according to any one 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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**

37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15
27869 Light BiPDL4-1$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2$_4$	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4$_4$	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1$_3$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1$_3$	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1$_2$	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1$_2$	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63

37464 Light BiPDL3-1$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69
37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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56. The method according to any one 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~~

Antibody~~Cl one~~	**Variable Sequence**	**SEQ ID NO:**
37468 Heavy BiPDL3-3$_4$	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	67
37468 Light BiPDL3-3$_4$	DIQMTQSPSSVSASVGDRVTITCRASQDISSFLAWYQQKPGKAPKLL IYAASSLQDGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKSVYF PPTFGGGTKVEIK	68
27907 Heavy BiPDL4-3$_4$	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	19
27907 Light BiPDL4-3$_4$	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASARAAGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCMQFGW WPPRTFGGGTKVEIK	20
27869 Heavy BiPDL4-1$_4$	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	15

27869 Light BiPDL4-1_4	EIVLTQSPGTLSLSPGERATLSCRASQFVYSSDLAWYQQKPGQAPRL LIYGASTRKTGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCLQFGW WPPRTFGGGTKVEIK	16
27893 Heavy BiPDL4-2_4	QVQLVESGGGVVQPGRSLRLSCAASGFTFDEYGMHWVRQAPGKGLEW VAVIGYDGLNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	17
27893 Light BiPDL4-2_4	EIVLTQSPGTLSLSPGERATLSCRASNSVVSSYLAWYQQKPGQAPRL LIYGAASRANGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	18
27924 Heavy BiPDL4-4_4	QVQLVESGGGVIQPGRSLRLSCAASGFTFSAYLMHWVRQAPGKGLEW VAAIGYDGMNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVY YCARAGIEYSYAYTDYWGQGTLVTVSS	21
27924 Light BiPDL4-4_4	EIVLTQSPGTLSLSPGERATLSCRASHSVVSSYLAWYQQKPGQAPRL LIYGASSREDGIPDRFSGSGSGTDFTLTISRLEPEDFAVYYCVQFGW WPPRTFGGGTKVEIK	22
21680 Heavy BiPDL3-1_3	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	23
21680 Light BiPDL3-1_3	DIQLTQSPSSVSASVGDRVTITCRASQGISSWLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQYVYF PPTFGGGTKVEIK	24
20786 Heavy BiPDL2-1_2	QVQLVQSGAEVKKPGSSVKVSCKASGGTFSSWLISWVRQAPGQGLEW MGGIIPILGTARYAQKFQGRVTITADESTSTAYMELSSLRSEDTAVY YCARVYRAASWFDPWGQGTLVTVSS	25
20786 Light BiPDL2-1_2	DIQMTQSPSSLSASVGDRVTITCQASQDISNYLNWYQQKPGKAPKLL IYDASNLETGVPSRFSGSGSGTDFTFTISSLQPEDIATYYCQQPFHL ITFGGGTKVEIK	26
37464 Heavy BiPDL3-1_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	63
37464 Light BiPDL3-1_4	DIQMTQSPSSVSASVGDRVTITCRASQGINSFLAWYQQKPGKAPKLL IYAASSLNSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	64
37465 Heavy BiPDL3-2_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	65
37465 Light BiPDL3-2_4	DIQMTQSPSSVSASVGDRVTITCRASQGISNFLAWYQQKPGKAPKLL IYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQKAVYF PPTFGGGTKVEIK	66
37475 Heavy BiPDL3-4_4	QVQLQQWGAGLLKPSETLSLTCAVYGGSLSGYPWSWIRQPPGKGLEW IGETDVSGWTDYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYY CARDGRRMGTPSFDIWGQGTMVTVSS	69

37475 Light BiPDL3-4$_4$	DIQMTQSPSSVSASVGDRVTITCRASQGISTFLAWYQQKPGKAPKLL IYAASALHSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQRAVYF PPTFGGGTKVEIK	70

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57. The method according to any one 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 according to any one of claims 46-57, wherein said cell is a cancer cell.

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 according to any one of claims 46-57, wherein said cell is a cell associated with immune suppression.

61. The method of claim 60, wherein said cell associated with immune suppression is a non-cancerous cell in the tumor microenvironment.

62. The method of claim 61, wherein said non-cancerous cell in the tumor microenvironment is a stromal or endothelial cell.

63. Use of an antibody or antibody fragment having ~~clone-paired~~ heavy chain CDR and light chain CDR sequences~~: from~~

Antibody	**CDRH1 (SEQ ID NO:)**	**CDRH2 (SEQ ID NO:)**	**CDRH3 (SEQ ID NO:)**
37468 BiPDL3-3$_4$	GSLSGYPWS (78)	ETDVSGWTDYNPSLKS (79)	ARDGRRMGTPSFDI (80)
27907 BiPDL4-3$_4$	FTFSAYLMH (33)	AIGYDGMNKYYADSVKG (34)	ARAGIEYSYAYTDY (35)
27869 BiPDL4-1$_4$	FTFDEYGMH (27)	VIGYDGLNKYYADSVKG (28)	ARAGIEYSYAYTDY (29)
27893	FTFDEYGMH	VIGYDGLNKYYADSVKG	ARAGIEYSYAYTDY

BiPDL4-2_4	(30)	(31)	(32)
27924 BiPDL4-4_4	FTFSAYLMH (36)	AIGYDGMNKYYADSVKG (37)	ARAGIEYSYAYTDY (38)
21680 BiPDL3-1_3	GSLSGYPWS (39)	ETDVSGWTDYNPSLKS (40)	ARDGRRMGTPSFDI (41)
20786 BiPDL2-1_2	GTFSSWLIS (42)	GIIPILGTARYAQKFQG (43)	ARVYRAASWFDP (44)
37464 BiPDL3-1_4	GSLSGYPWS (72)	ETDVSGWTDYNPSLKS (73)	ARDGRRMGTPSFDI (74)
37465 BiPDL3-2_4	GSLSGYPWS (75)	ETDVSGWTDYNPSLKS (76)	ARDGRRMGTPSFDI (77)
37475 BiPDL3-4_4	GSLSGYPWS (81)	ETDVSGWTDYNPSLKS (82)	ARDGRRMGTPSFDI (83)
37477 BiPDL3-5_4	GSLSGYPWS (84)	ETDVSGWTDYNPSLKS (85)	ARDGRRMGTPSFDI (86)

and from

Antibody	**CDRL1 (SEQ ID NO:)**	**CDRL2 (SEQ ID NO:)**	**CDRL3 (SEQ ID NO:)**
37468 BiPDL3-3_4	RASQDISSFLA (93)	AASSLQD (94)	QKSVYFPPT (95)
27907 BiPDL4-3_4	RASQFVYSSDLA (51)	GASARAA (52)	MQFGWWPPRT (53)
27869 BiPDL4-1_4	RASQFVYSSDLA (45)	GASTRKT (46)	LQFGWWPPRT (47)
27893 BiPDL4-2_4	RASNSVVSSYLA (48)	GAASRAN (49)	VQFGWWPPRT (50)
27924 BiPDL4-4_4	RASHSVVSSYLA (54)	GASSRED (55)	VQFGWWPPRT (56)
21680 BiPDL3-1_3	RASQGISSWLA (57)	AASSLQS (58)	QQYVYFPPT (59)
20786 BiPDL2-1_2	QASQDISNYLN (60)	DASNLET (61)	QQPFHLIT (62)

37464 BiPDL3-1_4	RASQGINSFLA (87)	AASSLNS (88)	QKAVYFPPT (89)
37465 BiPDL3-2_4	RASQGISNFLA (90)	AASSLQS (91)	QKAVYFPPT (92)
37475 BiPDL3-4_4	RASQGISTFLA (96)	AASALHS (97)	QRAVYFPPT (98)
37477 BiPDL3-5_4	RASKGISSFLA (99)	AADSIQS (100)	QSAVYFPPT (101)

, respectively, in the manufacture of a medicament for treating immune suppression in a tumor microenvironment.