I/We Claim:

1. An isolated antibody or antibody fragment which binds to human PD-1, comprising: light chain CDRs 1-3 SEQ ID NOs: 9, 10 and 11 respectively and heavy chain CDRs 1-3 SEQ ID NOs: 12, 13 and 14, respectively,

wherein said antibody or antibody fragment blocks binding of human PD-L1 and human PD-L2 to human PD-1.

2. The antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment blocks binding of human PD-L1 and/or human PD-L2 to human PD-1 with an IC50 of about 1 nM or lower.

3. An antibody or antibody fragment of any one of claims 1 to 2, comprising:

a. a heavy chain variable region comprising SEQ ID NO: 5; and

b. a light chain variable region comprising SEQ ID NO: 6.

4. The antibody of any one of claims 1 to 3, further comprising a heavy chain constant region comprising a γ4 or γ1 human heavy chain constant region.

5. The antibody or antibody fragment of any of the above claims, wherein the antibody or antibody fragment is:

a. a chimeric antibody or a fragment thereof;

b. a human antibody or a fragment thereof; or

c. a humanized antibody or a fragment thereof.

6. The antibody fragment of any of the above claims, wherein the antibody fragment is selected from the group consisting of Fab, Fab', Fab'-SH, Fv, scFv, F(ab')2, and a diabody.

7. The antibody or antibody fragment of any of the above claims, wherein the antibody or antibody fragment increases activation of T cells.

8. An isolated polynucleotide encoding the antibody or antibody fragment of any one of claims 1 to 7.

9. The isolated polynucleotide of claim 8, wherein the antibody comprises a heavy chain comprising SEQ ID NO: 5 and a light chain comprising SEQ ID NO: 6.

10. The isolated polynucleotide of claim 9, comprising SEQ ID NO: 1 and SEQ ID NO: 2.

11. An expression vector comprising the isolated polynucleotide of any one of claims 8 to 10.

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

13. A method of producing an antibody or antibody fragment according to any one of claims 1 to 7 comprising:

a. culturing the host cell of claim 12 in culture medium under conditions wherein the nucleic acid sequence is expressed, thereby producing polypeptides comprising the light and heavy chain variable regions; and

b. recovering the polypeptides from the host cell or culture medium.

14. The method of claim 13, wherein the antibody comprises:

a. a heavy chain variable region comprising SEQ ID NO: 5; and

b. a light chain variable region comprising SEQ ID NO: 6.

15. A composition comprising the antibody or antibody fragment of any one of claims 1 to 7 in combination with a pharmaceutically acceptable carrier or diluent.

16. The composition of claim 15, wherein the antibody comprises:

a. a heavy chain variable region comprising SEQ ID NO: 5; and

b. a light chain variable region comprising SEQ ID NO: 6.

Dated **13 December 2017**

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IN/PA- 1433

OF LAKSHMIKUMARAN & SRIDHARAN

AGENT FOR THE APPLICANT

To

The Controller of Patents

The Patent Office, at **Chennai**

I/We Claim:

1. An isolated antibody or antibody fragment which binds to human PD-1, comprising: light chain CDRs 1-3 SEQ ID NOs: 9, 10 and 11 respectively and heavy chain CDRs 1-3 SEQ ID NOs: 12, 13 and 14, respectively,

wherein said antibody or antibody fragment blocks binding of human PD-L1 and human PD-L2 to human PD-1.

2. The antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment blocks binding of human PD-L1 and/or human PD-L2 to human PD-1 with an IC50 of about 1 nM or lower.

~~3. The antibody or antibody fragment of claim 1 or 2, comprising:~~

~~a. a heavy chain variable region comprising SEQ ID NO: 5 or a variant thereof, wherein said variant comprises one, two or three conservatively modified amino acids; and~~

~~b. a light chain variable region comprising SEQ ID NO: 6 or a variant thereof, wherein said variant comprises one, two or three conservatively modified amino acid substitutions.~~

~~4~~3. An antibody or antibody fragment of any one of claims 1 to ~~3~~2, comprising:

a. a heavy chain variable region comprising SEQ ID NO: 5; and

b. a light chain variable region comprising SEQ ID NO: 6.

~~5~~4. The antibody of any one of claims 1 to ~~4~~3, further comprising a heavy chain constant region comprising a γ4 or γ1 human heavy chain constant region.

~~6~~5. The antibody or antibody fragment of any of the above claims, wherein the antibody or antibody fragment is:

a. a chimeric antibody or a fragment thereof;

b. a human antibody or a fragment thereof; or

c. a humanized antibody or a fragment thereof.

~~7~~6. The antibody fragment of any of the above claims, wherein the antibody fragment is selected from the group consisting of Fab, Fab', Fab'-SH, Fv, scFv, F(ab')2, and a diabody.

~~8~~7. The antibody or antibody fragment of any of the above claims, wherein the antibody or antibody fragment increases activation of T cells.

~~9~~8. An isolated polynucleotide encoding the antibody or antibody fragment of any one of claims 1 to ~~8~~7.

~~10~~9. The isolated polynucleotide of claim ~~9~~8, wherein the antibody comprises a heavy chain comprising SEQ ID NO: 5 and a light chain comprising SEQ ID NO: 6.

1~~1~~0. The isolated polynucleotide of claim ~~10~~9, comprising SEQ ID NO: 1 and SEQ ID NO: 2.

1~~2~~1. An expression vector comprising the isolated polynucleotide of any one of claims ~~9~~8 to 1~~1~~0.

1~~3~~2. A host cell comprising the expression vector of claim 1~~2~~1.

1~~4~~3. A method of producing an antibody or antibody fragment according to any one of claims 1 to ~~8~~7 comprising:

a. culturing the host cell of claim 1~~3~~2 in culture medium under conditions wherein the nucleic acid sequence is expressed, thereby producing polypeptides comprising the light and heavy chain variable regions; and

b. recovering the polypeptides from the host cell or culture medium.

1~~5~~4. The method of claim 1~~4~~3, wherein the antibody comprises:

a. a heavy chain variable region comprising SEQ ID NO: 5; and

b. a light chain variable region comprising SEQ ID NO: 6.

1~~6~~5. A composition comprising the antibody or antibody fragment of any one of claims 1 to ~~8~~7 in combination with a pharmaceutically acceptable carrier or diluent.

1~~7~~6. The composition of claim 1~~6~~5, wherein the antibody comprises:

a. a heavy chain variable region comprising SEQ ID NO: 5; and

b. a light chain variable region comprising SEQ ID NO: 6.