

**Claims**

1. An antibody that binds to alpha synuclein or an antigen-binding fragment of the antibody, wherein the antibody or the antigen binding fragment of the antibody comprises:
  - a. a light chain variable region comprising:
    - i. a CDR-L1 comprising SEQ ID NO: 1;
    - ii. a CDR-L2 comprising SEQ ID NO: 2 and
    - iii. a CDR-L3 comprising SEQ ID NO: 3; and
  - b. a heavy chain variable region comprising:
    - i. a CDR-H1 comprising SEQ ID NO: 4;
    - ii. a CDR-H2 comprising SEQ ID NO: 5 and
    - iii. a CDR-H3 comprising SEQ ID NO: 6.
2. The antibody or antigen-binding fragment of claim 1, wherein the antibody comprises a light chain variable region comprising SEQ ID NO: 15 and a heavy chain variable region comprising SEQ ID NO: 31.
3. The antibody or antigen-binding fragment of claim 1, wherein the antibody comprises a light chain comprising SEQ ID NO: 17 and a heavy chain comprising SEQ ID NO: 33.
4. The antibody or the antigen-binding fragment of claim 1, wherein the antibody binds an alpha synuclein epitope comprising, with reference to SEQ ID NO: 10, residues E123, Y125, E126, M127, P128, S129, E130 and E131, wherein the epitope optionally comprises A124 and G132.
5. The antibody or antigen-binding fragment thereof according to claim 1, wherein the antibody or antigen-binding fragment prevents aggregation of alpha synuclein induced by alpha synuclein fibrils.
6. The antibody or the antigen-binding fragment of claim 1, wherein the antibody or antigen-binding fragment is capable of binding alpha synuclein as a monomer and in fibrils.
7. The antibody or the antigen-binding fragment of claim 1, wherein the antibody or the antigen-binding fragment has a higher binding affinity for alpha synuclein in fibrils compared to monomeric alpha synuclein characterized by a constant of dissociation ( $K_D$ ) at least 10-fold higher for monomeric alpha synuclein than for alpha synuclein in fibrils.

8. The antibody or the antigen-binding fragment of claim 1, wherein the antibody or the antigen-binding fragment has a ( $K_D$ ) for alpha synuclein in fibrils of 300pM or less.
9. The antibody or the antigen-binding fragment of claim 1, wherein the antibody or the antigen-binding fragment does not bind beta synuclein and/or gamma synuclein.
10. The antibody or the antigen-binding fragment of claim 1, wherein the antibody is a chimeric or humanized antibody.
11. The antibody or antigen-binding fragment of claim 1, wherein the antibody is a full-length antibody.
12. The antibody or antigen-binding fragment of claim 11, wherein the full-length antibody is an IgG1, IgG4 or IgG4P.
13. The antibody or antigen-binding fragment of claim 1, wherein the antigen-binding fragment is a Fab, a Fab', a F(ab')<sub>2</sub> or a scFv.
14. An isolated polynucleotide encoding the antibody or the antigen-binding fragment of claim 1.
15. The isolated polynucleotide according to claim 14, wherein the polynucleotide encodes:
  - a. a light chain variable region, wherein the polynucleotide:
    - i. comprises a sequence that is at least 90% identical to SEQ ID NO: 16; or
    - ii. comprises SEQ ID NO: 16; or
  - b. a heavy chain variable region, wherein the polynucleotide:
    - i. comprises a sequence that is at least 90% identical to SEQ ID NO: 32; or
    - ii. comprises SEQ ID NO: 32.
16. A host cell comprising the polynucleotide of claim 14.
17. A cloning or expression vector comprising the polynucleotide of claim 14.
18. A host cell comprising the expression vector of claim 17.

19. A process for producing the antibody or antigen-binding fragment of claim 1, comprising culturing a host cell comprising a polynucleotide encoding the antibody or antigen-binding fragment under suitable conditions for producing the antibody or antigen-binding fragment and isolating the antibody or antigen-binding fragment.
20. A pharmaceutical composition comprising the antibody or antigen-binding fragment of claim 1 and one or more pharmaceutically acceptable carriers, excipients or diluents.
21. An antibody that binds to alpha-synuclein or an antigen-binding fragment of the antibody, wherein the antibody comprises a light chain variable region that is at least 80% identical to SEQ ID NO: 15 and a heavy chain variable region that is at least 80% identical to SEQ ID NO: 31, wherein the antibody or the antigen-binding fragment of the antibody comprises:
  - i) a CDR-L1 comprising SEQ ID NO: 1;
  - ii) a CDR-L2 comprising SEQ ID NO: 2;
  - iii) a CDR-L3 comprising SEQ ID NO: 3;
  - iv) a CDR-H1 comprising SEQ ID NO: 4;
  - v) a CDR-H2 comprising SEQ ID NO: 5; and
  - vi) a CDR-H3 comprising SEQ ID NO: 6.