CLAIMS

1. A method for purifying a protein from solution comprising:

(a) a first chromatography step comprising:

- passing said solution over a first chromatography column, said first chromatography column being an affinity chromatography column which is a Protein A column;
- eluting a crude protein eluent from the first chromatography column using a first elution buffer;

(b) a second chromatography step comprising:

- passing the crude protein eluent obtained at the end of step (a) over a second chromatography column, said second chromatography column being a multi-modal resin chromatography column;
- eluting a protein eluate from the second chromatography column using a second elution buffer; and

(c) a third chromatography step comprising:

- passing the protein eluate obtained at the end of step (b) through a third chromatography column in the flow-through mode, said third chromatography column being an anion-exchange chromatography column;
- recovering purified protein from the flow-through of the third chromatography column;

wherein each of the buffers consists of Bis Tris, acetic acid, NaCl, water, and optionally NH_4Cl, and wherein said method is run in continuous mode.

2. The method of claim 1, wherein the crude protein eluent obtained at the end of step (a) is directly passed over a second chromatography column, without undergoing any treatment such as pH adjustment, buffer exchange or dilution.

3. The method of claim 1 or 2, wherein the protein eluate obtained at the end of step (b) is directly passed over a third chromatography column, without undergoing any treatment such as pH adjustment, buffer exchange or dilution.

4. The method of any one of claims 1 to 3, wherein the method is run in a closed system from the first step to the last one.

5. The method of any one of claims 1 to 4, wherein each one of the two first chromatography steps comprises:

- passing equilibration buffer over the chromatography column;
- passing the solution or the crude protein eluent over the chromatography column;
- passing equilibration buffer over the chromatography column;
- optionally passing wash buffer over the chromatography column;
- optionally passing equilibration buffer over the chromatography column;
- eluting the crude protein eluent or the protein eluate from the chromatography column using an elution buffer,

wherein each of the buffers consists of Bis Tris, acetic acid, NaCl, water, and optionally NH_4Cl.

6. The method of any one of claims 1 to 5, wherein said method comprises the steps of:

(a) a first chromatography step comprising:

(i) passing equilibration buffer over a first chromatography column, said first chromatography column being an affinity chromatography column which is a Protein A column;

(ii) passing the solution over the first chromatography column;

(iii) passing equilibration buffer over the first chromatography column;

(iv) passing wash buffer over the first chromatography column;

(v) passing equilibration buffer over the first chromatography column; and

(vi) eluting a crude protein eluent from the first chromatography column using a first elution buffer;

(b) a second chromatography step comprising:

(i) passing equilibration buffer over a second chromatography column, said second chromatography column being a multi-modal resin chromatography column;

(ii) passing the crude protein eluent from step (a) over the second chromatography column;

(iii) passing equilibration buffer over the second chromatography column; and

(iv) eluting a protein eluate from the second chromatography column using a second elution buffer;

(c) a third chromatography step comprising:

(i) passing equilibration buffer over a third chromatography column, said third chromatography column being an anion-exchange chromatography column;

(ii) passing the protein eluate from step (b) over the third chromatography column in the flow-through mode;

(iii) optionally passing wash buffer over the third chromatography column; and

(iv) recovering purified protein from the flow-through of the third chromatography column.

7. The method of any one of claims 1 to 6, wherein the protein is a monoclonal antibody.

8. The method of claim 7, wherein said monoclonal antibody is selected from the group consisting of an antibody that specifically binds to the protofibrillar form of the human β-amyloid protein, an antibody that specifically binds to the bacterial surface polysaccharide poly-N-acetyl glucosamine (PNAG), an antibody that specifically binds to Carcinoembryonic antigen-related cell adhesion molecule 5 (CEACAM5) and an antibody that specifically binds to the CD38 transmembrane glycoprotein.

9. The method of any one of claims 1 to 8, further comprising a nanofiltration step after step (c).

10. The method of claim 9, further comprising an ultrafiltration and diafiltration step after the nanofiltration step.

11. The method of any one of claims 1 to 10, wherein the first elution buffer comprises 15 to 25 mM Bis Tris, and 15 to 25 mM NaCl, adjusted to a pH comprised between 3 and 4 with acetic acid.

12. The method of any one of claims 1 to 11, wherein the second elution buffer comprises 15 to 25 mM Bis Tris, 40 to 50 mM NaCl, and 20 to 30 mM NH_4Cl, adjusted to a pH comprised between 7 and 8 with acetic acid.

13. The method of any one of claims 5 to 12, wherein the equilibration buffer comprises 15 to 25 mM Bis Tris, and 15 to 25 mM NaCl, adjusted to a pH comprised between 7 and 8 with acetic acid.

14. The method of any one of claims 5 to 13, wherein the wash buffer comprises of 15 to 25 mM Bis Tris, and 0.9 to 1.1 M NaCl adjusted to a pH comprised between 7 and 8 with acetic acid.

15. The method of any one of claims 1 to 14, wherein the purified protein is recovered with a yield of at least 95%.

16. The method of any one of claims 1 to 15, wherein the recovered purified protein exhibits a purity of at least 99%.

17. The method of any one of claims 1 to 16, further comprising the step of formulating the recovered purified protein into a pharmaceutical composition.