

We claim:

1. A method for identifying regions in a protein that contribute to the viscosity of the protein, comprising:
 - microdialysing samples of the protein in a microdialysis cartridge against a buffer comprising deuterium for at least two different time periods;
 - subsequently quenching the microdialysis of the samples;
 - analyzing the quenched samples in an hydrogen/deuterium exchange mass spectrometry system to determine regions of the protein in the sample that have reduced levels of deuterium relative to other regions of the protein, wherein regions of the protein that have reduced levels of deuterium contribute to the viscosity of the protein.
2. The method of claim 1, wherein samples of protein comprise between 10 mg/mL to 200 mg/mL of protein.
3. The method of any one of claims 1 or 2, wherein samples of protein in the microdialysing step are in a buffer having a pH between 5.0 and 7.5.
4. The method of any one of claims 1-3, wherein the samples of protein in the microdialysing step are in 10 mM Histidine at pH 6.0.
5. The method of any one of claims 1-4, wherein the buffer comprising deuterium comprises 10 mM Histidine at pH 6.0.
6. The method of any one of claims 1-5, wherein the microdialysis is performed at 2 to 6 °C,
7. The method of any one of claims 1-6, wherein at least one sample is microdialysed for 4 hours and at least another sample is microdialysed for 24 hours.

8. The method of any one of claims 1-7, wherein the quenching step is performed at -2 to 2 °C for 1 to 5 minutes.
9. The method of any one of claims 1-8, further comprising digesting the protein into peptides before mass spectrometry analysis.
10. A method of modifying the viscosity of a protein drug, comprising:
identifying regions of the protein drug that contribute to the viscosity of the protein drug according to the method of any one of claims 1-9,
modifying one or more of the regions identified as contributing to the viscosity of the protein drug to modify the viscosity of the protein drug.
11. The method of claim 10, wherein at least one of the regions identified as contributing to the viscosity of the drug are modified by substituting one or more amino acids in the at least one region.
12. The method of any one of claims 10 or 11, wherein the one or more regions identified as contributing to the viscosity of the protein drug are modified to reduce the viscosity of the protein drug.
13. The method of any one of claims 1-12, wherein the protein is selected from the group consisting of an antibody, a fusion protein, a recombinant protein, or a combination thereof.
14. The method of any one of claims 10-13, wherein the protein drug is a concentrated monoclonal antibody.
15. The protein drug produced by the method of any one of claims 10-14.