

What is claimed is:

1. A native liquid chromatography-mass spectrometry system, comprising:
a liquid chromatography system capable of separating a sample; and
an electrospray ionization mass spectrometry (ESI-MS) system in fluid communication with the liquid chromatography system, wherein the ESI-MS system comprises a multi-nozzle electrospray ionization emitter, a system for modifying a desolvation gas, and a mass spectrometer, wherein the mass spectrometer is configured to receive ions and characterize mass to charge ratio of ions.
2. The native liquid chromatography-mass spectrometry system of claim 1, wherein the system for modifying a desolvation gas comprises a container having a cap, wherein the cap has an inlet line port and an outlet line port; a sheath gas inlet line for providing a sheath gas to the inlet line port; and a modified desolvation gas outlet line capable of connecting the modified desolvation gas outlet line port to the multi-nozzle electrospray ionization emitter.
3. The native liquid chromatography-mass spectrometry system of claim 2, wherein the container comprises an organic solvent and an additional chemical component.
4. The native liquid chromatography-mass spectrometry system of claim 3, wherein the additional chemical component is an acid.
5. The native liquid chromatography-mass spectrometry system of claim 4, wherein the acid is trifluoroacetic acid.
6. The native liquid chromatography-mass spectrometry system of claim 3, wherein the additional chemical component is a base.
7. The native liquid chromatography-mass spectrometry system of claim 6, wherein the base is triethylamine.
8. The native liquid chromatography-mass spectrometry system of any one of claims 3 to 7, wherein the organic solvent is acetonitrile.
9. The native liquid chromatography-mass spectrometry system of any one of claims 2 to 8, wherein the sheath gas is nitrogen.
10. The native liquid chromatography-mass spectrometry system of any one of claims 2 to 9, wherein the sheath gas inlet line is partially inserted into to the inlet line port.

11. The native liquid chromatography-mass spectrometry system of any one of claims 2 to 10, wherein the modified desolvation gas outlet line is partially inserted into the outlet line port.

12. The native liquid chromatography-mass spectrometry system of any one of claims 2 to 11, wherein the sheath gas flows from the sheath gas inlet line through the container containing an organic solvent into the desolvation gas outlet line.

13. The native liquid chromatography-mass spectrometry system of any one of claims 1 to 12, wherein the multi-nozzle electrospray ionization emitter includes eight nozzles.

14. The native liquid chromatography-mass spectrometry system of any one of claims 1 to 13, wherein the liquid chromatography system comprises a size exclusion chromatography (SEC) column.

15. The native liquid chromatography-mass spectrometry system of any one of claims 1 to 13, wherein the liquid chromatography system comprises an ion exchange chromatography (IEX) column.

16. The native liquid chromatography-mass spectrometry system of any one of claims 1 to 15, wherein the liquid chromatography-mass spectrometry system further comprises an analytical flow splitter for adjusting flow rate from the liquid chromatograph to the mass spectrometer.

17. The native liquid chromatography-mass spectrometry system of claim 16, wherein the analytical flow splitter is capable of providing an electrospray with a solvent flow rate of about 1 to 5 $\mu\text{L}/\text{min}$.

18. The native liquid chromatography-mass spectrometry system of any one of claims 1 to 17, wherein the mass spectrometer comprises an orbitrap mass analyzer.

19. A method of characterizing a protein in a sample, comprising:
supplying the sample to a liquid chromatography system capable of sample separation and fragmentation; and
analyzing the fragmented sample by use of an electrospray ionization mass spectrometry (ESI-MS) system in fluid communication with the liquid chromatography system, wherein the ESI-MS system comprises a multi-nozzle electrospray ionization emitter, a system for modifying a desolvation gas, and a mass spectrometer, wherein the mass spectrometer is

configured to receive ions and characterize mass to charge ratio of ions to identify the components of the protein to characterize the protein.

20. The method of claim 19, wherein the protein is an antibody, a fusion protein, recombinant protein, or a combination thereof.

22. The method of claim 21, wherein the antibody is a monoclonal antibody.

23. The method of claim 22, wherein the monoclonal antibody of isotype IgG1, IgG2, IgG3, IgG4, or mixed isotype.

24. The method of any one of claims 19-23, wherein the method does not require deglycosylation of the protein in the sample prior to supplying the sample to the liquid chromatography system.

25. The method of any one of claims 19-24, wherein the method is for characterizing high molecular weight and low molecular weight impurities.

26. The method of any one of claims 19-25, wherein the system for modifying a desolvation gas comprises a container having a cap, wherein the cap has an inlet line port and an outlet line port; a sheath gas inlet line for providing a sheath gas to the inlet line port; and a modified desolvation gas outlet line capable of connecting the modified desolvation gas outlet line port to the multi-nozzle electrospray ionization emitter.

27. The method of claim 26, wherein the container comprises an organic solvent and an additional chemical component.

28. The method of claim 27, wherein the additional chemical component is an acid.

29. The method of claim 28, wherein the acid is trifluoroacetic acid.

30. The method of claim 27, wherein the additional chemical component is a base.

31. The method of claim 30, wherein the base is triethylamine.

32. The method of any one of claims 27-31, wherein the organic solvent is acetonitrile.

33. The method of any one of claims 26 to 32, wherein the sheath gas is nitrogen.

34. The method of any one of claims 27 to 33 wherein the sheath gas inlet line is partially inserted into to the inlet line port.

35. The method of any one of claims 27 to 34, wherein the modified desolvation gas outlet line is partially inserted into to the outlet line port.

36. The method of any one of claims 27 to 35, wherein the sheath gas flows from the sheath gas inlet line through the container containing an organic solvent into the desolvation gas outlet line.

37. The method of any one of claims 26 to 36, wherein the multi-nozzle electrospray ionization emitter includes eight nozzles.

38. The method of any one of claims 19 to 37, wherein the liquid chromatography system comprises a size exclusion chromatography (SEC) column.

39. The method of any one of claims 19 to 37, wherein the liquid chromatography system comprises an ion exchange chromatography (IEX) column.

40. The method of any one of claims 29 to 39, further comprising an analytical flow splitter for adjusting flow rate from the liquid chromatograph to the mass spectrometer.

41. The method of claim 40, wherein the analytical flow splitter is capable of providing an electrospray with a solvent flow rate of about 1 to 5 $\mu\text{L}/\text{min}$.

42. The method of any one of claims 19 to 41, wherein the mass spectrometer comprises an orbitrap mass analyzer.