CLAIMS

What is claimed is:

1. An azeotropic or azeotrope-like composition comprising perfluoroheptene and a fluorinated ether selected from 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether, nonafluorobutyl methyl ether and nonafluorobutyl ethyl ether.

2. The azeotropic composition of claim 1, comprising from about 31.7 weight percent to about 47.8 weight percent perfluoroheptene, and from 52.2 weight percent to about 68.3 weight percent 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether.

3. The azeotrope-like composition of claim 1, comprising from about 6.1 weight percent to about 61.1 weight percent perfluoroheptene, and from about 38.9 weight percent to about 93.9 weight percent 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether.

4. The azeotrope-like composition of claim 1, comprising from about 16.8 weight percent to about 56 weight percent perfluoroheptene, and from about 44 weight percent to about 83.2 weight percent 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether.

5. The azeotrope-like composition of claim 1, comprising from about 24 weight percent to about 52 weight percent perfluoroheptene, and from about 48 weight percent to about 76 weight percent 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether.

6. The azeotropic composition of claim 1 comprising from about 0.9 weight percent to about 10.1 weight percent perfluoroheptene, and from 89.9 weight percent to about 99.1 weight percent nonafluorobutyl methyl ether.

7. The azeotrope-like composition of claim 1, comprising from about 0.9 weight percent to about 40.3 weight percent perfluoroheptene, and from about 59.7 weight percent to about 99.1 weight percent nonafluorobutyl methyl ether.

8. The azeotrope-like composition of claim 1, comprising from about 0.9 weight percent to about 27.3 weight percent perfluoroheptene, and from about 72.7 weight percent to about 99.1 weight percent nonafluorobutyl methyl ether.

9. The azeotrope-like composition of claim 1, comprising from about 0.9 weight percent to about 14 weight percent perfluoroheptene, and from about 86 weight percent to about 99.1 weight percent nonafluorobutyl methyl ether.

10. The azeotropic composition of claim 1 comprising from about 79.5 weight percent to about 84.8 weight percent perfluoroheptene, and from 15.2 weight percent to about 20.5 weight percent nonafluorobutyl ethyl ether.

11. The azeotrope-like composition of claim 1, comprising from about 61.3 weight percent to about 99.7 weight percent perfluoroheptene, and from about 0.3 weight percent to about 38.7 weight percent nonafluorobutyl ethyl ether.

12. The azeotrope-like composition of claim 1, comprising from about 67.8 weight percent to about 93.4 weight percent perfluoroheptene, and from about 6.6 weight percent to about 32.2 weight percent nonafluorobutyl ethyl ether.

13. The azeotrope-like composition of claim 1, comprising from about 74.3 weight percent to about 89.5 weight percent perfluoroheptene, and from about 10.5 weight percent to about 25.7 weight percent nonafluorobutyl ethyl ether.

14. An immersion cooling unit comprising:

an immersion cell, defining an internal cavity;

i) an electronic component in the internal cavity;

ii) a dielectric working fluid partially filling the internal cavity;

iii) a condensing coil, positioned in the internal cavity above the electronic component;

wherein the dielectric working fluid at least partially immerses the electronic component; and

wherein the dielectric working fluid includes an azeotropic or azeotrope-like composition comprising perfluoroheptene and a fluorinated ether selected from 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether, nonafluorobutyl methyl ether and nonafluorobutyl ethyl ether.

15. The immersion cooling unit of claim 14, wherein the dielectric working fluid does not immerse the condensing coil.

16. The immersion cooling unit of claim 14, wherein an operating temperature range is between 40°C and 80°C.

17. The immersion cooling unit of claim 16, wherein the operating temperature range is between 50°C and 70°C.

18. The immersion cooling unit of claim 14, wherein the volume resistivity of the dielectric working fluid is at least 1×10^{10}.

19. The immersion cooling unit of claim 14, wherein the volume resistivity of the dielectric working fluid is at least 1×10^{11}.

20. The immersion cooling unit of claim 14, wherein the volume resistivity of the dielectric working fluid is at least 1×10^{12}.

21. The immersion cooling unit of claim 14, wherein the dielectric working fluid has a global warming potential (GWP) of less than 500.

22. The immersion cooling unit of claim 14, wherein the electronic component is one of: microprocessors, wafers used to manufacture semiconductor devices, power control semiconductors, electrical distribution switch gear, power transformers, circuit boards, multi-chip modules, packaged and unpackaged semiconductor devices, laser, fuel cells and electrochemical cells.

23. The immersion cooling unit of claim 14, wherein the dielectric working fluid comprises the azeotropic mixture of from about 31.7 weight percent to about 47.8 weight percent perfluoroheptene, and from 52.2 weight percent to about 68.3 weight percent 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether

24. The immersion cooling unit of claim 14, wherein the dielectric working fluid comprises the azeotope-like mixture of from about 16.8 weight percent to about 56 weight percent perfluoroheptene, and from about 44 weight percent to about 83.2 weight percent 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether.

25. A method for cooling an electrical component comprising:

at least partially immersing an electrical component in a working fluid; and

transferring heat from the electrical component using the working fluid;

wherein the working fluid comprises an azeotropic or azeotrope-like composition comprising perfluoroheptene and a fluorinated ether selected from 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether, nonafluorobutyl methyl ether and nonafluorobutyl ethyl ether.

26. The method of claim 25, where said transferring of heat occurs through pumping of said working fluid from the electrical component to be cooled to a remote heat sink.

27. The method of claim 26, where said transferring of heat occurs through vaporization of said working fluid in contact with the electrical component to be cooled, and condensing said working fluid vapor through contact with a heat sink.

28. A method of replacing a high-GWP dielectric fluid in an immersion cooling system, comprising:

charging an immersion cooling system that was designed for use with a perfluorinated working fluid with a composition comprising an azeotropic or azeotrope-like composition comprising perfluoroheptene and a fluorinated ether selected from 1,1,2,2-tetrafluoroethyl-2,2,2-trifluoroethyl ether, nonafluorobutyl methyl ether and nonafluorobutyl ethyl ether.