WHAT IS CLAIMED IS:

1. A microneedle assembly comprising an array of microneedles being arranged in at least one predetermined geometric pattern on a support, wherein the microneedles contain a base that includes a lower portion positioned in proximity to the support and an opposing upper portion extending from the lower portion in a longitudinal direction, wherein a tip extends from the upper portion of the base in the longitudinal direction and terminates at an edge, the tip, the base, or a combination thereof include a polymer composition containing a liquid crystalline polymer having a melting temperature of 300°C or more, wherein a ratio of the deflection temperature under load as determined in accordance with ISO Test No. 75-2:2013 at a load of 1.8 Megapascals to the melting temperature is from 0.75 to 1, and wherein a centerline extends through the base in the longitudinal direction, and further wherein the microneedles exhibit an offset factor, *k*, of 20 or less as determined according to the following equation:

$$k = O/((L_1+L_2)/D)$$

wherein,

O is a distance that the edge of the tip is offset from the centerline in a lateral direction perpendicular to the longitudinal direction;

L_1 is a length of the tip;

L_2 is a length of the base; and

D is a width of the base.

2. The microneedle assembly of claim 1, wherein the distance O is 100 micrometers or less.

3. The microneedle assembly of claim 1, wherein the tip has a length of from 5 to 500 nanometers.

4. The microneedle assembly of claim 1, wherein the tip has a width of from 0.5 to 5 micrometers.

5. The microneedle assembly of claim 1, wherein the base has a length of from 10 to 1,000 nanometers.

6. The microneedle assembly of claim 1, wherein the base has a width of from 5 to 100 micrometers.

7. The microneedle assembly of claim 1, wherein the microneedles have a length of from 10 to 1,200 nanometers.

8. The microneedle assembly of claim 1, wherein the tip is offset from the predetermined geometric pattern by a distance of only 100 micrometers or less.

9. The microneedle assembly of claim 1, wherein the predetermined geometric pattern is a first line that extends in a first direction, wherein the tip of the microneedles in the first line is offset from the first line by a distance of only 100 micrometers or less in a second direction perpendicular to the first direction.

10. The microneedle assembly of claim 9, wherein the array includes a second line that extends in the second direction, wherein the tip of the microneedles in the second line is offset from the second line by a distance of only 100 micrometers or less in the first direction.

11. The microneedle assembly of claim 1, wherein the edge of the tip is oriented at an angle of 15 degrees or less relative to the centerline.

12. The microneedle assembly claim 1, wherein the polymer composition exhibits a melt viscosity of 100 Pa.s or less as determined in accordance with ISO Test No. 11443:2014 at a shear rate of 1,000 seconds^{-1} and temperature of 30°C above the melting temperature.

13. The microneedle assembly claim 1, wherein the liquid crystalline polymer has a melting temperature of 320°C or more.

14. The microneedle assembly of claim 1, wherein the polymer composition exhibits a tensile elongation of 5% or less as determined at in accordance with ISO Test No. 527:2012 at a temperature of 23°C.

15. The microneedle assembly of claim 1, wherein the polymer composition exhibits a deflection temperature under load of 250°C or more as determined in accordance with ISO Test No. 75-2:2013 at a load of 1.8 Megapascals.

16. The microneedle assembly of claim 15, wherein the ratio of the deflection temperature under load to the melting temperature is from 0.75 to 0.95.

17. The microneedle assembly of claim 1, wherein the polymer composition exhibits a tensile modulus of 7,000 MPa or more as determined in accordance with ISO Test No. 527:2012 at a temperature of 23°C.

18. The microneedle assembly of claim 1, wherein the liquid crystalline polymer contains repeating units derived from one or more aromatic dicarboxylic acids, one or more aromatic hydroxycarboxylic acids, or a combination thereof.

19. The microneedle assembly of claim 18, wherein the aromatic hydroxycarboxylic acids include 4-hydroxybenzoic acid, 6-hydroxy-2-naphthoic acid, or a combination thereof.

20. The microneedle assembly of claim 18, wherein the aromatic hydroxycarboxylic acids include terephthalic acid, isophthalic acid, 2,6-naphthalenedicarboxylic acid, or a combination thereof.

21. The microneedle assembly of claim 20, wherein the liquid crystalline polymer further contains repeating units derived from one or more aromatic diols.

22. The microneedle assembly of claim 21, wherein the aromatic diols include hydroquinone, 4,4'-biphenol, or a combination thereof.

23. The microneedle assembly of claim 1, wherein the liquid crystalline polymer is wholly aromatic.

24. The microneedle assembly of claim 1, wherein the liquid crystalline polymer contains repeating units derived from naphthenic hydroxycarboxylic and/or dicarboxylic acids in an amount of 10 mol.% or more.

25. The microneedle assembly of claim 1, wherein the liquid crystalline polymer contains repeating units derived from 6-hydroxy-2-naphthoic acid in an amount of 30 mol.% or more.

26. The microneedle assembly of claim 1, wherein liquid crystalline polymers constitute from 30 wt.% to 99 wt.% of the polymer composition.

27. The microneedle assembly of claim 1, wherein the polymer composition further comprises a mineral filler.

28. The microneedle assembly of claim 27, wherein the mineral filler is in the form of particles.

29. The microneedle assembly of claim 28, wherein the particles have a median size of 10 micrometers or less.

30. The microneedle assembly of claim 28, wherein the particles have a median size of from 0.6 to 2.5 micrometers.

31. The microneedle assembly of claim 28, wherein the particles include talc.

32. The microneedle assembly of claim 1, wherein the polymer composition further comprises a tribological additive material.

33. The microneedle assembly of claim 32, wherein the tribological additive material includes a fluoropolymer.

34. The microneedle assembly of claim 1, wherein the base includes the polymer composition.

35. The microneedle assembly of claim 1, wherein the tip includes polymer composition.

36. The microneedle assembly of claim 1, wherein the assembly is configured to deliver a drug compound.

37. The microneedle assembly of claim 36, wherein the drug compound includes a proteinaceous compound, polynucleotide agent, vaccine, small molecule agent, anti-infection agent, hormone, drug regulating cardiac action or blood flow, or a combination thereof.

38. The microneedle assembly of claim 36, wherein the drug compound has a molecular weight of 1 kDa or more.

39. The microneedle assembly of claim 36, wherein the drug compound includes a viral vaccine antigen.

40. The microneedle assembly of claim 39, wherein the vaccine antigen is a coronavirus vaccine antigen.

41. The microneedle assembly of claim 39, wherein the vaccine antigen is a viral vector, live attenuated virus, or an inactivated virus.

42. The microneedle assembly of claim 39, wherein the viral vaccine antigen includes mRNA-1273, BNT162, Ad5-nCoV, ChAdOx1, bacTRL-Spike, BCG, AdCovid, NVX-CoV2373, LV-SMENP, SARS recombinant spike protein plus delta inulin, SARS VLPs S protein and influenza M1 protein, DNA vaccine VRC-SRSDNA015-00-VP, VEEV replicon particles expressing the SARS-CoV S, inactivated SARS-CoV-2 virus or viral vector, live attenuated SARS-CoV-2 virus, or a combination thereof.

43. The microneedle assembly of claim 39, wherein the viral vaccine antigen is derived from and/or used for prophylaxis against adenoviruses, arenaviruses, bunyaviruses, flavirviruses, hantaviruses, hepadnaviruses, herpesviruses, papilomaviruses, paramyxoviruses, parvoviruses, picornaviruses, poxviruses, orthomyxoviruses, retroviruses, reoviruses, rhabdoviruses, rotaviruses, spongiform viruses, togaviruses, or a combination thereof.

44. The microneedle assembly of claim 36, wherein the drug compound is coated onto a surface of the microneedles.

45. The microneedle assembly of claim 44, wherein the microneedles are solid.

46. The microneedle assembly of claim 36, wherein the microneedles contain at least one channel through which the drug compound is capable of flowing.

47. A method for delivering a drug compound to a subject, the method comprising:

placing the transdermal delivery device of claim 36 adjacent to the skin of a subject;

penetrating a stratum corneum of the skin with the microneedles; and

transporting the drug compound from the microneedles and across the stratum corneum.

48. A method for detecting an analyte in a subject, the method comprising:

placing the microneedle assembly of claim 36 adjacent to the skin of a subject;

penetrating a stratum corneum of the skin with the microneedles so that the microneedle contacts a bodily fluid of the subject; and

detecting the presence of an analyte within the bodily fluid.

49. The method of claim 48, wherein the bodily fluid is blood.

50. The method of claim 48, wherein the analyte is detected on a surface of the microneedle.

51. The method of claim 48, wherein the microneedles are solid.

52. The method of claim 48, wherein the analyte is glucose.

53. The method of claim 48, wherein the bodily fluid is withdrawn from the subject through the microneedles.