CLAIMS:

1 . A biologic adsorbent structure having a polymer-containing substrate comprising:

i) a substantially fixed topography comprising pillar-like substructures having an average cross-section width ranging from 1 to 10 microns, an average height ranging from 3 to 20 microns, and an aspect ratio ranging from 1 to 20; and

ii) a plasma-treated surface exhibiting a water contact angle no greater than 60 degrees.

2. The structure of claim 1 wherein the polymer provides a water contact angle of 60 degrees or greater when tested in the form of a flat untreated film or untreated film with substructures.

3. The structure of claim 2 wherein the polymer is selected from poly(dimethyl)siloxane (PDMS), polypropylene (PP), and poly(lactic-co-glycolic acid) (PLGA).

4. The structure of claim 1 wherein the polymer is a thermosetting polymer.

5. The structure of claim 4 wherein the polymer is poly(dimethyl)siloxane.

6. The structure of claim 1 wherein the topography is a cast topography.

7. The structure of claim 6 wherein said cast topography is obtained using a mold prepared using at least one of photolithography and polycarbonate membrane.

8. The structure of claim 1 wherein the polymer is a thermoplastic polymer.

9. The structure of claim 8 wherein the polymer is selected from poly(propylene) and poly(lactide-co-glycolide).

10 . The structure of claim 1 wherein the topography is formed by an imprinting or hot embossing process.

11. The structure of claim 10 wherein said imprinted topography is obtained using a mold prepared using at least one of photolithography and a polycarbonate membrane.

12. The structure of claim 1 wherein the plasma-treated surface is an oxygen plasma-treated surface.

13. The structure of claim 12 wherein the plasma-treated surface is a surface treated at 50 to 150 watts for 15 to 45 seconds.

14. The structure of claim 12 wherein the plasma-treated surface is a surface treated at 75 to 125 watts for 25 to 35 seconds.

15. The structure of claim 1 wherein the ratio of increased surface area compared to a flat surface is at least 1.01.

16. The structure of claim 15 wherein the ratio of increased surface area compared to a flat surface is at least 1.1 .

17 . The structure of claim 16 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 100 nanometers to 100 microns.

18. The structure of claim 17 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 1 to 50 microns.

19. The structure of claim 1 wherein the pillar-like substructures have a protrusion density of from about $1x10^5$ to about $6x10^8$ protrusions/cm^2.

20. The structure of claim 19 wherein the pillar-like substructures have a protrusion density of from about $1x10^7$ to about $5x10^7$ protrusions per cm^2.

21. A diagnostic test device comprising the structure of claim 1 whose surface is capable of adsorbing a biologic analyte.

22. A method for preparing a biologic adsorbent structure which comprises:

a) contacting a polymeric mass with a shaped surface to impart increased surface area compared to a flat surface and provide a surface of substantially fixed topography comprising pillar-like substructures; and

b) plasma-treating the surface of substantially fixed topography to increase wettability as measured by water contact angle, to provide a surface exhibiting a water contact angle of 60 degress or less..

23. The method of claim 22 wherein the polymer provides a water contact angle of 60 degrees or greater when tested in the form of a flat untreated film or untreated film with substructures.

24. The method of claim 23 wherein the polymer is selected from poly(dimethyl)siloxane (PDMS), polypropylene (PP), and poly(lactic-co-glycolic acid) (PLGA).

25. The method of claim 22 wherein said contacting is carried out by casting.

26. The method of claim 25 wherein said casting uses a mold prepared using at least one of photolithography and polycarbonate membrane.

27. The method of claim 22 wherein said contacting is performed by imprinting or hot embossing.

28. The method of claim 27 wherein said imprinting uses a mold prepared using at least one of photolithography and polycarbonate membrane.

29. The method of claim 22 wherein the plasma-treated surface is treated with oxygen plasma.

30. The method of claim 29 wherein the plasma-treated surface is treated at 50 to 150 watts for 15 to 45 seconds.

31. The method of claim 29 wherein the plasma-treated surface is treated at 75 to 125 watts for 25 to 35 seconds.

32. The method of claim 22 wherein the pillar-like substructures have an average cross-section width ranging from 100 nanometers to 50 microns, an average height ranging from 1 to 50 microns, and an aspect ratio ranging from 0.1 to 50.

33. The method of claim 32 wherein the pillar-like substructures have an average cross-section width ranging from 1 to 10 microns, an average height ranging from 3 to 20 microns, and an aspect ratio ranging from 1 to 20.

34. The method of claim 22 wherein the ratio of increased surface area compared to a flat surface is at least 1.01.

35. The method of claim 34 wherein the ratio of increased surface area compared to a flat surface is at least 1.1.

36. The method of claim 32 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 100 nanometers to 100 microns.

37. The method of claim 36 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 1 to 50 microns.

38. The method of claim 32 wherein the pillar-like substructures have a protrusion density of from about $1x10^5$ to about $6x10^8$ protrusions/cm^2.

39. The method of claim 38 wherein the pillar-like substructures have a protrusion density of from about $1x10^7$ to about $5x10^7$ protrusions per cm^2.

40. A method for modulating the amount adsorption of a biologic to a polymeric structure comprising a substantially fixed topography of pillar-like substructures having an average cross-section width ranging from 100 nanometers to 50 microns, an average height ranging from 1 to 50 microns, and an aspect ratio ranging from 0.1 to 50

whose amount of biologic adsorption is otherwise not a function of surface area which comprises:

surface treating the structure by plasma treatment to increase wettability without substantially altering the topography.

41. The method of claim 40 wherein the increase in wettability is determined by measuring a reduction in water contact angle for the treated surface compared to the untreated surface.

42. The method of claim 40 wherein the biologic is selected from at least one of sugar, lipid, protein, nucleic acid, and polynucleotide.

43. The method of claim 40 wherein the plasma treatment is oxygen plasma treatment.

44. The method of claim 40 wherein the plasma-treated surface is treated under conditions sufficient to increase wettability to an extent sufficient to provide a water contact angle of no greater than 60 degrees without substantially altering the topography.

45. The method of claim 43 wherein the plasma-treated surface is treated under conditions sufficient to increase wettability to an extent sufficient to provide a water contact angle of no greater than 60 degrees without substantially altering the topography.

Claims

1 . A biologic adsorbent structure having a polymer-containing substrate comprising:

i) a substantially fixed topography comprising pillar-like substructures comprising said polymer and having an average and constant cross-section width ranging from 1 to 10 microns, an average height ranging from 3 to 20 microns, and an aspect ratio ranging from 1 to 20; and

ii) a plasma-treated surface exhibiting a water contact angle no greater than 60 degrees.

2. The structure of claim 1 wherein the polymer provides a water contact angle of 60 degrees or greater when tested in the form of a flat untreated film or untreated film with substructures.

3. The structure of claim 2 wherein the polymer is selected from poly(dimethyl)siloxane (PDMS), polypropylene (PP), and poly(lactic-co-glycolic acid) (PLGA).

4. The structure of claim 1 wherein the polymer is a thermosetting polymer.

5. The structure of claim 4 wherein the polymer is poly(dimethyl)siloxane.

6. The structure of claim 1 wherein the topography is a cast topography.

7. The structure of claim 6 wherein said cast topography is obtained using a mold prepared using at least one of photolithography and polycarbonate membrane.

8. The structure of claim 1 wherein the polymer is a thermoplastic polymer.

9. The structure of claim 8 wherein the polymer is selected from poly(propylene) and poly(lactide-co-glycolide).

10 . The structure of claim 1 wherein the topography is formed by an imprinting or hot embossing process.

11. The structure of claim 10 wherein said imprinted topography is obtained using a mold prepared using at least one of photolithography and a polycarbonate membrane.

12. The structure of claim 1 wherein the plasma-treated surface is an oxygen plasma-treated surface.

13. The structure of claim 12 wherein the plasma-treated surface is a surface treated at 50 to 150 watts for 15 to 45 seconds.

14. The structure of claim 12 wherein the plasma-treated surface is a surface treated at 75 to 125 watts for 25 to 35 seconds.

15. The structure of claim 1 wherein the ratio of increased surface area compared to a flat surface is at least 1.01.

16. The structure of claim 15 wherein the ratio of increased surface area compared to a flat surface is at least 1.1.

17 . The structure of claim 16 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 100 nanometers to 100 microns.

18. The structure of claim 17 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 1 to 50 microns.

19. The structure of claim 1 wherein the pillar-like substructures have a protrusion density of from about $1x10^5$ to about $6x10^8$ protrusions/cm^2.

20. The structure of claim 19 wherein the pillar-like substructures have a protrusion density of from about $1x10^7$ to about 5x10 protrusions per cm^2.

21. A diagnostic test device comprising the structure of claim 1 whose surface is capable of adsorbing a biologic analyte.

22. A method for preparing a biologic adsorbent structure which comprises:

a) contacting a polymeric mass with a shaped surface to impart increased surface area compared to a flat surface and provide a surface of substantially fixed topography comprising pillar-like substructures having a constant cross-section width; and

b) plasma-treating the surface of substantially fixed topography to increase wettability as measured by water contact angle, to provide a surface exhibiting a water contact angle of 60 degress or less.

23. The method of claim 22 wherein the polymer provides a water contact angle of 60 degrees or greater when tested in the form of a flat untreated film or untreated film with substructures.

24. The method of claim 23 wherein the polymer is selected from poly(dimethyl)siloxane (PDMS), polypropylene (PP), and poly(lactic-co-glycolic acid) (PLGA).

25. The method of claim 22 wherein said contacting is carried out by casting.

26. The method of claim 25 wherein said casting uses a mold prepared using at least one of photolithography and polycarbonate membrane.

27. The method of claim 22 wherein said contacting is performed by imprinting or hot embossing.

28. The method of claim 27 wherein said imprinting uses a mold prepared using at least

one of photolithography and polycarbonate membrane.

29. The method of claim 22 wherein the plasma-treated surface is treated with oxygen plasma.

30. The method of claim 29 wherein the plasma-treated surface is treated at 50 to 150 watts for 15 to 45 seconds.

31. The method of claim 29 wherein the plasma-treated surface is treated at 75 to 125 watts for 25 to 35 seconds.

32. The method of claim 22 wherein the pillar-like substructures have an average cross-section width ranging from 100 nanometers to 50 microns, an average height ranging from 1 to 50 microns, and an aspect ratio ranging from 0.1 to 50.

33. The method of claim 32 wherein the pillar-like substructures have an *average* cross-section width ranging from 1 to 10 microns, an *average* height ranging from 3 to 20 microns, and an aspect ratio ranging from 1 to 20.

34. The method of claim 22 wherein the ratio of increased surface area compared to a flat surface is at least 1.01.

35. The method of claim 34 wherein the ratio of increased surface area compared to a flat surface is at least 1.1.

36 . The method of claim 32 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 100 nanometers to 100 microns.

37. The method of claim 36 wherein the pillar-like substructures are spaced apart at an average inter-structural spacing of from 1 to 50 microns.

38. The method of claim 32 wherein the pillar-like substructures have a protrusion density of from about $1x10^5$ to about $6x10^8$ protrusions/cm^2.

39. The method of claim 38 wherein the pillar-like substructures have a protrusion density of from about $1x10^7$ to about $5x10^7$ protrusions er cm^2.

40. A method for modulating the amount adsorption of a biologic to a polymeric structure comprising a substantially fixed topography of pillar-like substructures having a constant, average cross-section width ranging from 100 nanometers to 50 microns, an average height ranging from 1 to 50 microns, and an aspect ratio ranging from 0.1 to 50 whose amount of biologic adsorption is otherwise not a function of surface area which comprises:

surface treating the structure by plasma treatment to increase wettability without substantially altering the topography.

41. The method of claim 40 wherein the increase in wettability is determined by

measuring a reduction in water contact angle for the treated surface compared to the untreated surface.

42. The method of claim 40 wherein the biologic is selected from at least one of sugar, lipid, protein, nucleic acid, and polynucleotide.

43. The method of claim 40 wherein the plasma treatment is oxygen plasma treatment.

44. The method of claim 40 wherein the plasma-treated surface is treated under conditions sufficient to increase wettability to an extent sufficient to provide a water contact angle of no greater than 60 degrees without substantially altering the topography.

45. The method of claim 43 wherein the plasma-treated surface is treated under conditions sufficient to increase wettability to an extent sufficient to provide a water contact angle of no greater than 60 degrees without substantially altering the topography.