CLAIMS

1. A wound dressing having a polymeric superporous hydrogel comprising:

a copolymer of poly(alkylvinylether/maleic acid) or a copolymer of poly(styrene/maleic anhydride);

polyvinyl alcohol (PVA) or hydroxyethylcellulose (HEC); and

a plurality of pores.

2. The wound dressing of claim 1, wherein the copolymer of poly(alkylvinylether/maleic acid) is poly(methyl vinyl ether-*alt*-maleic acid) (PMVEMAC).

3. The wound dressing of claim 1, wherein the copolymer of poly(styrene/maleic anhydride) is poly(styrene-co-maleic anhydride) (SMA).

4. The wound dressing of claim 1, comprising polyvinyl alcohol (PVA).

5. The wound dressing of claim 1, wherein the average pore size of the plurality of pores ranges from 5 μm to l mm.

6. The wound dressing of claim 1, wherein the polymeric superporous hydrogel exhibits a swelling ratio between 4000% and 8500% after 24 hours.

7. The wound dressing of claim 1, wherein the polymeric superporous hydrogel exhibits an elastic modulus (Young's modulus) between $1x10^{-5}$ N/mm^2 and $4x10^{-5}$ N/mm^2.

8. The wound dressing of claim 1, wherein the polymeric superporous hydrogel exhibits a tensile stress at break between $0.3x10^{-5}$ N/mm^2 and $1.3x10^{-4}$ N/mm^2.

9. The wound dressing of claim 1, wherein the polymeric superporous hydrogel exhibits a maximum strength between $3x10^{-2}$ N/mm and $6.3x10^{-2}$ N/mm.

10. A method of making a wound dressing having a polymeric superporous hydrogel

including a copolymer of poly(alkylvinylether/maleic acid) or a copolymer of poly(styrene/maleic anhydride), polyvinyl alcohol (PVA) or hydroxyethylcellulose (HEC), and a plurality of pores, the method comprising:

mixing an aqueous solution of a copolymer of poly(alkylvinylether/maleic acid) or a copolymer of poly(styrene/maleic anhydride) with an aqueous solution of polyvinyl alcohol (PVA) or hydroxyethylcellulose (HEC);

adding a blowing agent to form gas bubbles; and

heating the resulting mixture at elevated pressure to form the polymeric superporous hydrogel.

11. The method of claim 10, wherein the copolymer of poly(alkylvinylether/maleic acid) is poly(methyl vinyl ether-*alt*-maleic acid) (PMVEMAC).

12. The method of claim 10, wherein the copolymer of poly(styrene/maleic anhydride) is poly(styrene-co-maleic anhydride) (SMA).

13. The method of claim 10, wherein one of the aqueous solutions is polyvinyl alcohol (PVA).

14. The method of claim 10, wherein the blowing agent is a carbonate.

15. The method of claim 14, wherein the carbonate is sodium carbonate, sodium bicarbonate, potassium carbonate, potassium bicarbonate, calcium carbonate, calcium bicarbonate, or lithium carbonate.

16. The method of claim 15, wherein the carbonate is sodium bicarbonate.

17. The method of claim 10, wherein the blowing agent is a solid substance.

18. The method of claim 10, wherein the amount of the blowing agent is between 0.1% w/v and 1% w/v.

19. The method of claim 10, wherein heating the resulting mixture at elevated pressure is conducted for between 30 min and 2 hours.

20. The method of claim 10, wherein heating the resulting mixture is conducted at between 110 °C and 140 °C.

21. The method of claim 10, wherein the elevated pressure is between 15 psi and 40 psi.

22. The method of claim 10, wherein the method of making does not comprise the use of additional cross-linkers.

23. The method of claim 10, wherein the method of making does not comprise the use of initiators.

24. The method of claim 10, wherein the method of making does not comprise the use of foam stabilizers.

25. The method of claim 10, wherein the method of making does not comprise the use of organic solvents.

26. The method of claim 10, wherein the method of making does not comprise any purification steps.

27. The method of claim 10, wherein the average pore size in the polymeric superporous hydrogel ranges from 5 μm to 1 mm.

28. A method of making a wound dressing having polymeric superporous hydrogel including a copolymer of poly(alkylvinylether/maleic acid) or a copolymer of poly(styrene/maleic anhydride), polyvinyl alcohol (PVA) or hydroxyethylcellulose (HEC), and a plurality of pores, the method comprising:

mixing an aqueous solution of a copolymer of poly(alkylvinylether/maleic acid) or a copolymer of poly(styrene/maleic anhydride) with an aqueous solution of polyvinyl alcohol (PVA), hydroxyethylcellulose (HEC), or poly(acrylic acid) (PAA);

adding a blowing agent as a solid to form gas bubbles; and

heating the resulting mixture at elevated pressure to form the polymeric superporous hydrogel.

29. The wound dressing of claim 1, wherein the wound dressing further comprises an active agent.

30. The wound dressing of claim 29, wherein the active agent is selected from an anti-inflammatory agent, an anesthetic, or a combination thereof.

31. The wound dressing of claim 30, wherein the active agent is a topical corticosteroid.

32. The wound dressing of claim 31, wherein the topical corticosteroid is hydrocortisone, clobetasone butyrate, or betamethasone dipropionate.

33. The wound dressing of claim 30, wherein the active agent is lidocaine or benzocaine.

34. A polymeric superporous hydrogel obtained by the method of claim 10.

35. A polymeric superporous hydrogel obtained by the method of claim 28.

36. A polymeric superporous hydrogel as claimed in claim 34 or claim 35 for use as an antimicrobial agent.