Claims

1. A~~n~~ method of preparing an antibacterial cryogel, the method comprising:

immersing a non-swollen cryogel in a first solution comprising a precursor of an antibacterial agent to form a swollen modified cryogel, wherein the swollen modified cryogel comprises a polymeric cryogel matrix and the precursor of the ~~an~~ antibacterial agent incorporated therein, wherein the non-swollen cryogel comprises polysodium acrylate (PSA); and

removing the swollen modified cryogel from the first solution and immersing the swollen modified cryogel in a second solution comprising a reducing agent to reduce the precursor of the antibacterial agent to an antibacterial agent.

2. The method according to claim 1, wherein the precursor of the antibacterial agent and ~~cryogel according to claim 1, wherein~~ the antibacterial agent ~~is~~ are nanoparticles.

3. The method ~~antibacterial cryogel~~ according to claim 2, wherein the antibacterial agent nanoparticles comprise~~s or consists of~~ a metal, metal ion, metal oxide, sulfobetaine methacrylate, a peptide, a protein, or a polypeptide.

4. The method ~~antibacterial cryogel~~ according to claim 3, wherein the antibacterial agent nanoparticles comprise~~s~~ silver (Ag), silver ions (Ag^+), copper (Cu), copper (II) oxide (CuO), titanium dioxide (TiO_2), or zinc oxide (ZnO).

5. The method ~~antibacterial cryogel~~ according to claim 1~~4~~, wherein the precursor of the antibacterial agent is selected from the group consisting of silver acetate, silver fluoride, silver sulfate, and silver nitrate~~polymeric cryogel matrix comprises or consists of an acrylic polymer or copolymer, preferably poly(sodium acrylate), an acrylamide polymer or copolymer, or a hydroxyethylmethacrylate polymer or copolymer~~.

6. The~~A~~ method according to claim 1, wherein the reducing agent is selected from the group consisting of sodium borohydride ($NaBH_4$), citric acid, hydrazine, and ascorbic acid.~~of preparing an antibacterial cryogel, comprising:~~

~~immersing a cryogel in a first solution comprising a precursor of an antibacterial agent to form a modified cryogel, wherein the modified cryogel comprises a polymeric cryogel matrix and the precursor of the antibacterial agent incorporated therein;~~

~~removing the modified cryogel from the first solution and immersing the modified cryogel in a second solution comprising a reducing agent to reduce the precursor of the antibacterial agent to an antibacterial agent.~~

7. A~~The~~ method of disinfecting drinking water for point-of-use application, comprising:

immersing the antibacterial cryogel prepared by the method of claim 1 in contaminated water to allow the antibacterial cryogel to swell; and

squeezing the swollen antibacterial cryogel to release water therefrom~~method according to claim 6, wherein the precursor of the antibacterial agent and the antibacterial agent are nanoparticles~~.

8. The method according to claim 7, further comprising drying the antibacterial cryogel for re-use~~wherein the antibacterial agent nanoparticles comprise or consists of a metal, metal ion, metal oxide, sulfobetaine methacrylate, a peptide, a protein, or a polypeptide~~.

9. A~~The~~ method~~-~~ of preparing an antibacterial porous hydrogel, the method comprising:

introducing pore forming agents during polymerization of monomers to form a non-swollen porous hydrogel, wherein the non-swollen porous hydrogel comprises polysodium acrylate (PSA);

immersing the non-swollen porous hydrogel in a first solution comprising a precursor of an antibacterial agent to form a swollen modified porous hydrogel, wherein the swollen

modified porous hydrogel comprises a porous polymeric hydrogel matrix and the precursor of the antibacterial agent incorporated therein; and

removing the swollen modified porous hydrogel from the first solution and immersing the swollen modified porous hydrogel in a second solution comprising a reducing agent to reduce the precursor of the antibacterial agent to an antibacterial agent~~according to claim 8, wherein the antibacterial agent nanoparticles comprise silver (Ag), silver ions (Ag^+), copper (Cu), copper (II) oxide (CuO), titanium dioxide (TiO_2), or zinc oxide (ZnO)~~.

10. A~~The~~ method~~-~~ of disinfecting drinking water for point-of-use application, comprising:

immersing the antibacterial porous hydrogel prepared by the method of claim 9 in contaminated water to allow the antibacterial porous hydrogel to swell; and

squeezing the swollen antibacterial porous hydrogel to release water therefrom~~according to any one of claims 6-9, wherein the precursor of the antibacterial agent is selected from the group consisting of silver acetate, silver fluoride, silver sulfate, and silver nitrate~~.

~~11. The method according to any one of claims 6-10, wherein the reducing agent is selected from the group consisting of sodium borohydride ($NaBH_4$), citric acid, hydrazine, and ascorbic acid.~~

~~12. The method according to any one of claims 6-11, wherein the modified cryogel comprises a polymeric cryogel matrix comprising or consisting of an acrylic polymer or copolymer, preferably poly(sodium acrylate), an acrylamide polymer or copolymer, or a hydroxyethylmethacrylate polymer or copolymer.~~

~~13. A method of disinfecting drinking water for point-of-use application, comprising:~~

~~immersing an antibacterial cryogel of any one of claims 1-5 or an antibacterial cryogel prepared by a method of any one of claims 6-12 in contaminated water to allow the antibacterial cryogel to swell; and~~

~~squeezing the swollen antibacterial cryogel to release water therefrom.~~

14. The method of claim 13, further comprising drying the antibacterial cryogel for re-use.

15. An antibacterial porous hydrogel comprising a porous polymeric hydrogel matrix and an antibacterial agent incorporated into pores of the porous polymeric hydrogel matrix.

16. A method of preparing an antibacterial porous hydrogel, comprising:

immersing a porous hydrogel in a first solution comprising a precursor of an antibacterial agent to form a modified porous hydrogel, wherein the modified porous hydrogel comprises a porous polymeric hydrogel matrix and the precursor of the antibacterial agent incorporated therein;

removing the modified porous hydrogel from the first solution and immersing the modified porous hydrogel in a second solution comprising a reducing agent to reduce the precursor of the antibacterial agent to an antibacterial agent.

17. A method of disinfecting drinking water for point-of-use application, comprising:

immersing an antibacterial porous hydrogel of claim 15 or an antibacterial porous hydrogel prepared by a method of claim 16 in contaminated water to allow the antibacterial porous hydrogel to swell; and

squeezing the swollen antibacterial porous hydrogel to release water therefrom.