Claims

1. A 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 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 the antibacterial agent are nanoparticles.

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

4. The method according to claim 3, 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).

5. The method according to claim 1, wherein the precursor of the antibacterial agent is selected from the group consisting of silver acetate, silver fluoride, silver sulfate, and silver nitrate.

6. The 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.

7. A 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.

8. The method according to claim 7, further comprising drying the antibacterial cryogel for re-use.

9. A 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.

10. A 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.