

What is claimed is:

1. A method for producing a water-soluble thermally-crosslinkable polymeric material, comprising the steps of:
 - (1) obtaining a reactive mixture which is an aqueous solution comprising
 - (a) an azetidinium-containing polymer having azetidinium groups,
 - (b) a hydrophilicity-enhancing agent (i.e., a wetting agent) having at least one reactive functional group selected from the group consisting of primary amino group, secondary amino group, carboxyl group, thiol group, and a combination thereof, and
 - (c) one or more non-polymeric ionic compounds, provided that the aqueous solution either has a pH of at least 8.0 (preferably at least 8.5, more preferably at least 9.0, even more preferably at least 9.5) and/or that the non-polymeric ionic compounds are present in the aqueous solution in a total amount of (i) 0 mM to about 135 mM (preferably about 0.5 mM to about 130 mM, more preferably from about 1 mM to about 120 mM) if the hydrophilicity-enhancing agent is non-ionic or positively-charged at the pH of the aqueous solution or (ii) from about 20 millimolars (mM) to about 135 mM (preferably about 25 mM to about 130 mM, more preferably from about 30 mM to about 120 mM) if the hydrophilicity-enhancing agent is negatively-charged at the pH of the aqueous solution; and
 - (2) heating the reactive mixture to reach a reaction temperature of from about 40°C to about 85°C and maintaining the temperature of the reactive mixture at the reaction temperature for a time period sufficient to obtain the water-soluble thermally-crosslinkable polymeric material in which the hydrophilicity-enhancing agent is covalently attached to the azetidinium-containing polymer through one or more covalent linkages each formed between one azetidinium group and one reactive functional group,wherein the water-soluble thermally-crosslinkable polymeric material comprises azetidinium groups.
2. The method of claim 1, wherein the reactive mixture comprises from 0.01% to about 10% by weight (preferably from 0.05% to about 5% by weight, more preferably from 0.08% to about 1% by weight, even more preferably from 0.1% to about 0.4% by weight) of the azetidinium-containing polymer and from about 0.01% to about 10% by weight (preferably from 0.02% to about 5% by weight, more preferably from 0.05% to about 2% by weight, even more preferably from 0.08% to about 1.0% by weight) of the hydrophilicity-enhancing agent having at least one reactive function group, provided

that the concentration ratio of the azetidinium-containing polymer to the hydrophilicity-enhancing agent in the reactive mixture is from about 1000:1 to 1:1000 (preferably from about 500:1 to about 1:500, more preferably from about 250:1 to about 1:250, even more preferably from about 100:1 to about 1:100).

3. The method of claim 1 or 2, wherein the azetidinium-containing polymer is an epichlorohydrin-functionalized polyamine.
4. The method of claim 3, wherein the epichlorohydrin-functionalized polyamine is polyamidoamine-epichlorohydrin.
5. The method of claim 3, wherein the epichlorohydrin-functionalized polyamine is a poly(2-oxazoline-co-ethyleneimine)-epichlorohydrin.
6. The method of claim 1 or 2, wherein the azetidinium-containing polymer is a homopolymer or copolymer of an azetidinium-containing vinylic monomer.
7. The method of any one of claims 1 to 6, wherein the hydrophilicity-enhancing agent is: a polyethylene glycol having one sole primary or secondary amino, carboxyl, or thiol group; a polyethylene glycol with two terminal primary or secondary amino, carboxyl, and/or thiol groups; a multi-arm polyethylene glycol with one or more primary or secondary amino, carboxyl, and/or thiol groups; a polyethylene glycol dendrimer with one or more primary or secondary amino, carboxyl, and/or thiol groups.
8. The method of any one of claims 1 to 6, wherein the hydrophilicity-enhancing agent is a copolymer which is a polymerization product of a composition comprising (1) about 60% or less by weight (preferably about 50% or less by weight, more preferably from about 0.1% to about 30% by weight, even more preferably from about 0.5% to about 20% by weight, most preferably from about 1% to about 15% by weight) of one or more reactive vinylic monomers and (2) one or more non-reactive hydrophilic vinylic monomers.
9. The method of claim 8, wherein said one or more reactive vinylic monomers are vinylic monomers having a carboxyl group.
10. The method of claim 9, wherein said one or more reactive vinylic monomers are selected from the group consisting of acrylic acid, C₁-C₄ alkylacrylic acid (e.g., methacrylic acid, ethylacrylic acid, propylacrylic acid, butylacrylic acid), N-2-(meth)acrylamidoglycolic acid, beta methyl-acrylic acid (crotonic acid), alpha-phenyl acrylic acid, beta-acryloxy propionic acid, sorbic acid, angelic acid, cinnamic acid, 1-carboxy-4-phenyl butadiene-1,3, itaconic acid, citraconic acid, mesaconic acid, glutaconic acid, aconitic acid, maleic acid, fumaric acid, tricarboxy ethylene, and combinations thereof.
11. The method of claim 9, wherein said one or more reactive vinylic monomers are acrylic acid, methylacrylic acid, or combinations thereof.

12. The method of claim 8, wherein said one or more reactive vinylic monomers are vinylic monomers having a primary or secondary amino group.
13. The method of claim 12, wherein said one or more reactive vinylic monomers are amino-C₂-C₆ alkyl (meth)acrylate, C₁-C₆ alkylamino-C₂-C₆ alkyl (meth)acrylate, allylamine, vinylamine, amino-C₂-C₆ alkyl (meth)acrylamide, C₁-C₆ alkylamino-C₂-C₆ alkyl (meth)acrylamide, and combinations thereof.
14. The method of any one of claims 8 to 13, wherein said one or more non-reactive vinylic monomers are selected from the group consisting of (meth)acrylamide, N,N-dimethyl (meth)acrylamide, N-vinylpyrrolidone (NVP), N-vinyl formamide, N-vinyl acetamide, N-vinyl isopropylamide, N-vinyl-N-methyl acetamide, N,N-dimethylaminoethyl (meth)acrylate, N,N-dimethylaminopropyl (meth)acrylamide, glycerol (meth)acrylate, 3-(meth)acryloylamino-1-propanol, N-hydroxyethyl (meth)acrylamide, N-hydroxypropyl (meth)acrylamide, *N*-[tris(hydroxymethyl)methyl]-acrylamide, N-methyl-3-methylene-2-pyrrolidone, 1-ethyl-3-methylene-2-pyrrolidone, 1-methyl-5-methylene-2-pyrrolidone, 1-ethyl-5-methylene-2-pyrrolidone, 5-methyl-3-methylene-2-pyrrolidone, 5-ethyl-3-methylene-2-pyrrolidone, 2-hydroxyethyl (meth)acrylate, hydroxypropyl (meth)acrylate, C₁-C₄-alkoxy polyethylene glycol (meth)acrylate having a weight average molecular weight of up to 1500 Daltons, allyl alcohol, vinyl alcohol, and combinations thereof.
15. The method of any one of claims 8 to 13, wherein said one or more non-reactive vinylic monomers are phosphorylcholine-containing vinylic monomers.
16. The method of any one of claims 8 to 13, wherein said one or more non-reactive vinylic monomers are methacryloyloxyethyl phosphorylcholine.
17. The method of any one of claims 8 to 13, wherein said one or more non-reactive vinylic monomers are selected from the group consisting of acryamide, N,N-dimethylacrylamide, N-vinylpyrrolidone, (meth)acryloyloxyethyl phosphorylcholine, N-vinyl-N-methyl acetamide, glycerol (meth)acrylate, hydroxyethyl (meth)acrylate, N-hydroxyethyl (meth)acrylamide, C₁-C₄-alkoxy polyethylene glycol (meth)acrylate having a weight average molecular weight of up to 400 Daltons, vinyl alcohol, and combination thereof.
18. The method of any one of claims 1 to 6, wherein the hydrophilicity-enhancing agent is a primary or secondary amino- or carboxyl-containing polysaccharide, hyaluronic acid, chondroitin sulfate, and combinations thereof.
19. The method of any one of claims 1 to 6, wherein the hydrophilicity-enhancing agent is a primary or secondary amino-containing monosaccharide, a carboxyl-containing monosaccharide, a thiol-containing monosaccharide, a primary or secondary amino-containing disaccharide, a carboxyl-containing disaccharide, a thiol-containing disaccharide, a primary or secondary amino-containing oligosaccharide, a carboxyl-

- containing oligosaccharide, a thiol-containing oligosaccharide, or a combination thereof.
20. The method of any one of claims 1 to 19, wherein the concentrations of the hydrophilicity-enhancing agent and the azetidinium-containing polymer in the aqueous solution are at least about 10 times of a targeted concentration of the water-soluble thermal-crosslinkable polymeric material in a packaging solution to be used for forming a non-silicone hydrogel coating on a hydrogel contact lens or a medical device according to in-package-crosslinking (IPC) process.