MOISTURIZING COMPOSITIONS AND USES THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application No. 62/294,706 filed on February 12, 2016, and U.S. Provisional Patent Application No. 62/394,540 filed on September 14, 2016, the disclosures of which are incorporated by reference in their entireties.

SUMMARY

[0002] Embodiments herein are directed to moisturizing compositions comprising: an interpenetrating polymer network made up of a crosslinked polypeptide or polysaccharide; a branched polymer with a hydrophobic modification; and a linear polypeptide or polysaccharide. In some embodiments, the composition is an interpenetrating polymer network comprising a crosslinked polypeptide or polysaccharide; a branched polymer with a hydrophobic modification; and a linear polypeptide or polysaccharide, wherein the crosslinked polypeptide or polysaccharide entraps the interlaced branched polymer with a hydrophobic modification and the linear polypeptide or polysaccharide to form the interpenetrating polymer network.

[0002a] In a first aspect, there is provided an interpenetrating polymer network moisturizing composition comprising:

a crosslinked polypeptide or polysaccharide;

a branched polymer with a hydrophobic modification; and

a linear polypeptide or polysaccharide; wherein the crosslinked polypeptide or polysaccharide entraps the interlaced branched polymer with a hydrophobic modification and the linear polypeptide or polysaccharide to form the interpenetrating polymer network.

[0002b] In a second aspect, there is provided a drug or active ingredient delivery system comprising:

a crosslinked polypeptide or polysaccharide;

a branched polymer with a hydrophobic modification;

a linear polypeptide or polysaccharide;

wherein the crosslinked polypeptide or polysaccharide entraps the interlaced branched polymer with a hydrophobic modification and the linear polypeptide or polysaccharide to form the interpenetrating polymer network; and

a drug or active ingredient.

[0003] Some embodiments are directed to methods of treating dry and/or irritated skin comprising administering a moisturizing composition comprising: an interpenetrating polymer network made up of a crosslinked polypeptide or polysaccharide; a branched polymer with a hydrophobic modification; and a linear polypeptide or polysaccharide.

[0003a] In a third aspect, there is provided use of the moisturizing composition or delivery system as described herein in the manufacture of a medicament for treating dry and/or irritated skin.

[0004] Some embodiments are directed to a method of producing an interpenetrating polymer network moisturizing composition, the method comprising: dispersing a non-crosslinked polypeptide or polysaccharide capable of crosslinking in water to form a first phase; combining a linear polypeptide or polysaccharide and a branched polymer with a hydrophobic modification with a humectant to form a second phase; combining the first and second phases to form a third phase of uncrosslinked interlaced polymers, polypeptides, or polysaccharides; adding a mono-valent ion, di-valent ion or a combination thereof to the third phase to crosslink one or more polypeptide, polymer, or polysaccharide to form an interpenetrating polymer network moisturizing composition.

[0004a] In a fourth aspect, there is provided a method of producing a interpenetrating polymer network moisturizing composition, the method comprising:

dispersing a non-crosslinked polypeptide or polysaccharide capable of crosslinking in water to form a first phase;

combining a linear polypeptide or polysaccharide and branched polymer with a hydrophobic modification with a humectant to form a second phase;

combining the first and second phases to form a third phase of uncrosslinked interlaced polymers, polypeptides, or polysaccharides;

adding at least one crosslinking agent to the third phase to crosslink one or more polypeptide, polymer, or polysaccharide to form an interpenetrating polymer network moisturizing composition.

CLAIMS

What is claimed:

1. An interpenetrating polymer network moisturizing composition comprising:
a crosslinked polypeptide or polysaccharide;
a branched polymer with a hydrophobic modification; and

a linear polypeptide or polysaccharide;wherein the crosslinked polypeptide or polysaccharide entraps the interlaced branched polymer with a hydrophobic modification and the linear polypeptide or polysaccharide to form the interpenetrating polymer network.

2. A drug or active ingredient delivery system comprising:
a crosslinked polypeptide or polysaccharide;
a branched polymer with a hydrophobic modification;
a linear polypeptide or polysaccharide;
wherein the crosslinked polypeptide or polysaccharide entraps the interlaced branched polymer with a hydrophobic modification and the linear polypeptide or polysaccharide to form the interpenetrating polymer network; and
a drug or active ingredient.

3. The moisturizing composition or delivery system of claims 1 or 2, wherein the crosslinked polypeptide or polysaccharide is selected from the group consisting of crosslinked gellan gum, crosslinked carrageenan, crosslinked chitosan, crosslinked xanthan gum, sodium polyglutamate crosspolymer, polydextrose, and combinations thereof.

4. The moisturizing composition or delivery system of claims 1 or 2, wherein the branched polymer with a hydrophobic modification is selected from the group consisting of hydrophobically modified hydroxypropylmethylcellulose, hydrophobically modified cetyl hydroxy propyl methyl cellulose, hydrophobically modified sodium acetyl hyaluronate, hydrophobically modified cetyl hydroxyethylcellulose, hydrophobically modified starch, hydrophobically modified carboxymethylchitosan, and combinations thereof.

5. The moisturizing composition or delivery system of claims 1 or 2, wherein the linear polypeptide or polysaccharide is selected from the group consisting of gellan gum,

carrageenan, xanthan gum, biosaccharide gum-1, sclerotium gum, pectin, pullulan, guar gum, gum arabic, chondroitin, alginic acid, sodium hyaluronate, hydrolyzed hyaluronic acid sodium polyglutamate, chitin, chitosan, starch, and combinations thereof.

6. The moisturizing composition or delivery system of claims 1 or 2, further comprising a mono-, or di-valent ion, wherein the mono-, or di-valent ion is selected from the group consisting of 2-Pyrrolidone-5-Carboxylic Acid (PCA) and related salts including Calcium PCA, Sodium PCA, Zinc PCA, Magnesium PCA , sea salt, inorganic salts of citric acid, inorganic salts of lactic acid, calcium ascorbate, magnesium ascorbate, calcium oxide, calcium benzoate, calcium sorbate, calcium aspartate, magnesium carbonate, magnesium chloride, magnesium nitrate, and any combination thereof.

7. The moisturizing composition or delivery system of claims 1 or 2, further comprising at least one humectant, wherein the at least one humectant is selected from the group consisting of glycerin, diglycerin, betaine, diols, propylene glycol, butylene glycol, pentylene glycol, propanediol, 1,2-hexanediol, D-ribose, glucose, sorbitol, dextrose, urea, 2-Pyrrolidone-5-Carboxylic Acid and related salts, sea salt, inorganic salts of citric acid, inorganic salts of lactic acid, ectoin, lactic acid, betaine, glycolic acid, lactobionic acid, and any combination thereof.

8. The moisturizing composition or delivery system of claims 1 or 2, wherein the moisturizing composition is selected from the group consisting of liquid, solution, emulsion, cream, suspension, triturate, jelly, foam, paste, ointment, shampoo, adhesive, serum, milk, lotion, salve, oil, butter, gel, and balm.

9. The moisturizing composition or delivery system of claims 1 or 2, wherein the crosslinked polypeptide or polysaccharide is crosslinked gellan gum, the branched polymer with a hydrophobic modification is cetyl hydroxyethylcellulose, and the linear polypeptide or polysaccharide is sodium hyaluronate.

10. The moisturizing composition of claim 9, further comprising calcium PCA and magnesium PCA.

11. Use of the moisturizing composition or delivery system of any of claims 1-10 in the manufacture of a medicament for treating dry and/or irritated skin.

12. A method of producing a interpenetrating polymer network moisturizing composition, the method comprising:

dispersing a non-crosslinked polypeptide or polysaccharide capable of crosslinking in water to form a first phase;

combining a linear polypeptide or polysaccharide and branched polymer with a hydrophobic modification with a humectant to form a second phase;

combining the first and second phases to form a third phase of uncrosslinked interlaced polymers, polypeptides, or polysaccharides;

adding at least one crosslinking agent to the third phase to crosslink one or more polypeptide, polymer, or polysaccharide to form an interpenetrating polymer network moisturizing composition.

13. The method of claim 12, wherein the linear polypeptide or polysaccharide is selected from the group consisting of gellan gum, carrageenan, xanthan gum, biosaccharide gum-1, sclerotium gum, pectin, pullulan, guar gum, gum arabic, chondroitin, sulfate, alginic acid, sodium hyaluronate, hydrolyzed hyaluronic acid sodium polyglutamate, chitin, chitosan, starch, and combinations thereof.

14. The method of claim 12, wherein the non-crosslinked polypeptide or polysaccharide capable of crosslinking is selected from the group consisting of gellan gum, carrageenan, chitosan xanthan gum, sodium polyglutamate crosspolymer, polydextrose , and combinations thereof.

15. The method of claim 12, the at least one crosslinking agent is selected from group consisting of 2-Pyrrolidone-5-Carboxylic Acid and related salts, calcium PCA, sodium PCA, zinc PCA, magnesium PCA, sea salt, inorganic salts of citric acid, inorganic salts of lactic acid, calcium ascorbate, magnesium ascorbate, calcium oxide, calcium benzoate, calcium sorbate, calcium aspartate, magnesium carbonate, magnesium chloride, magnesium nitrate, and any combination thereof.