**WHAT IS CLAIMED:**

1. A method of preparing a hydrogel comprising crosslinked glycosaminoglycan (GAG) molecules, the method comprising crosslinking a GAG having a molecular weight of at least 2.0 MDa with a crosslinker, to obtain a glycosaminoglycan hydrogel having GAG molecules crosslinked by amide bonds, wherein:

the crosslinker comprises diaminotrehalose (DATH);

the concentration of GAG is between 2% and 10% (w/w); and

the molar ratio of the crosslinker to GAG is at least 0.1 mol% per GAG disaccharide and less than or equal to 2 mol% per GAG disaccharide.

2. The method of preparing a hydrogel according to claim 1, wherein

if the GAG concentration is between 2% and 4.5% (w/w), then the concentration of crosslinker is between 0.8 and 2 mol% per GAG disaccharide; and

if the GAG concentration is between 4.6% and 5.9% (w/w), then the concentration of crosslinker is between 0.5 and 0.8 mol% per GAG disaccharide; and

if the GAG concentration is between 6% and 10% (w/w), then the concentration of crosslinker is between 0.3 and 0.5 mol% per GAG disaccharide.

3. The method according to claim 1 , wherein the crosslinking comprises:

(1) providing a solution of glycosaminoglycan (GAG) molecules;

(2) activating carboxyl groups on the glycosaminoglycan molecules with a coupling agent to form activated glycosaminoglycan molecules;

(3) crosslinking the activated glycosaminoglycan (GAG) molecules via their activated carboxyl groups using the crosslinker to obtain a glycosaminoglycan hydrogel crosslinked by amide bonds.

4. The method according to claim 3, wherein the coupling agent is a triazine-based coupling agent, such as 4-(4,6-dimethoxy-1,3,5-triazin-2-yl)-4-methylmorpholinium chloride (DMTMM).

5. The method according to any one of claims 1-4, wherein the crosslinking is performed at a pH of 5.0 – 9.0, preferably at a pH of 6.0 – 8.0.

6. The method according to any one of claims 1-5, further comprising formulating the crosslinked hydrogel to a final glycosaminoglycan (GAG) concentration of 10 - 45 mg/mL.

7. The method according to any one of claims 1-6, further comprising sterilizing the crosslinked hydrogel.

8. The method according to any one of claims 1-7, wherein the glycosaminoglycan (GAG) is hyaluronic acid (HA).

9. The method according to any one of claims 1-8, wherein the GAG has a molecular weight of 2.1 – 3.5 MDa.

10. The method according to any one of claims 1-9, wherein the concentration of GAG is between 3 and 5 % (w/w).

11. The method according to any one of claims 1-10, wherein the molar ratio of crosslinker to GAG is between 0.9 and 1.1mol%per GAG disaccharide.

12. The method according to any one of claims 1-15, wherein the GAG is hyaluronic acid (HA) having a molecular weight of 2.0 – 3.5 MDa and the crosslinker is diaminotrehalose (DATH), and further wherein the concentration of HA is between 3 and 5 % (w/w) and the molar ratio of DATH to HA is between 0.9 and 1.1mol% per GAG disaccharide.

13. The hydrogel product obtained by the method according to any one of claims 1-12.

14. A hydrogel product comprising glycosaminoglycan (GAG) molecules as the swellable polymer, wherein:

the glycosaminoglycan molecules are crosslinked by amide bonds formed between the GAG and diaminotrehalose (DATH);

the GAG molecules have a molecular weight of at least 2.0 MDa; and

wherein the thermostability (measured as NormGe1C) of the swellable polymer is above 80% after 24 hours.

15. The hydrogel product according to claim 13 or 14 , wherein the glycosaminoglycan (GAG) is hyaluronic acid (HA).

16. The hydrogel product according to any one of claims 13-15, wherein the hydrogel product is sterilized.

17. A pharmaceutical composition for cosmetically treating skin, which comprises a hydrogel product to any one of claims 13-16.