Claims

1. A polysaccharide based aerogel comprising a network of polysaccharide fibers with pores therebetween, wherein the sizes of the pores are in the micrometer range of more than or equal to 1 µm to less than 1000 µm, and wherein said polysaccharide is obtained from a recyclable material.

2. The aerogel of claim 1, wherein the pore sizes are in the range of: more than 20 µm to 50 μm, 50 µm to less than 1000 μm, 30 µm to about 250 μm, or 40 µm to 200 μm.

3. The aerogel of any one of the preceding claims, wherein the polysaccharide fibers are cellulose fibers, and wherein the diameters of the cellulose fibers are in the range of 5 µm to 100 μm or 8 µm to 50 μm.

4. The aerogel of any one of the preceding claims, wherein said aerogel has a porosity in the range of 94% to 98%, wherein the thermal conductivity of said aerogel is in the range of 0.02 to 0.04 $Wm^{-1}K^{-1}$ and wherein said aerogel is coated with a hydrophobic agent.

5. The aerogel of any one of the preceding claims, wherein said polysaccharide fibers are functionalized with a silane compound, said silane compound comprises at least one functional group selected from the group consisting of alkenyl, alkyl, alkoxy, benzyl, acryloxy, amino, ureide, sulfide, isocyanurate, mercapto and isocyanate.

6. The aerogel of any one of the preceding claims, wherein said polysaccharide is selected from the group consisting of cellulose, lignin, hemicellulose, chitin, arabinoxylan and pectin.

7. The aerogel of any one of the preceding claims, wherein said polysaccharide fibers are bonded to each other via hydrogen bonding.

8. A method for forming a polysaccharide based aerogel comprising the steps of:

a. dissolving polysaccharide fibers from a recyclable material in a polysaccharide solvent in the presence of sound energy to form a polysaccharide dispersion; and

b. forming said polysaccharide dispersion into said aerogel.

9. The method of claim 8, wherein step (b) comprises the steps of:

c. forming said polysaccharide dispersion into a gel; and

d. drying said polysaccharide gel to form said aerogel .

10. The method of claim 9, wherein said drying step (d) comprises freeze-drying or supercritical drying.

11. The method of any one of claims 8 to 10, wherein said polysaccharide solvent is an aqueous solution of alkali with urea or thiourea.

12. A method for forming a hydrophobic polysaccharide based aerogel comprising the steps of:

a. dissolving polysaccharide fibers from a recyclable material in a polysaccharide solvent in the presence of sound energy to form a polysaccharide dispersion;

b. forming said polysaccharide dispersion into said aerogel; and

c. coating said aerogel with a hydrophobic agent.

13. The method of claim 12, wherein said coating step comprises spraying said aerogel with said hydrophobic agent.

14. The method of claim 12, wherein said coating step comprises the step of applying said hydrophobic agent by gas phase chemical vapour deposition.

15. The method of any one of claims 12 to 14, further comprising the step of removing excess hydrophobic agent from said coated hydrophobic aerogel.

16. A reusable absorbent comprising a polysaccharide based aerogel having a network of polysaccharide fibers with pores therebetween, wherein the sizes of the pores are in the micrometer range of more than or equal to 1 µm to less than 1000 µm, and wherein said polysaccharide is obtained from a recyclable material.

17. The absorbent of claim 16, wherein the absorbance capacity of said absorbent for a liquid is up to 25 times the weight of said absorbent, said liquid being a polar liquid or non-polar liquid.

18. The absorbent of any one of claims 16 to 17, wherein said absorbent is reusable for at least three times.

19. The absorbent of claim 18, wherein any absorbed liquid therein is removed by exerting a pressure on said absorbent, thereby allowing said absorbent to be reused.

20. Use of a polysaccharide based aerogel having a network of polysaccharide fibers with pores therebetween, wherein the sizes of the pores are in the micrometer range of more than or equal to 1 µm to less than 1000 µm, and wherein said polysaccharide is obtained from a recyclable material, for absorbing a non-polar liquid.