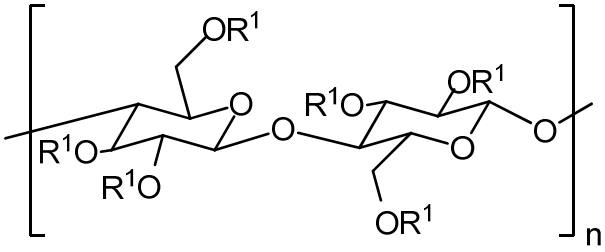
CLAIMS

1. Method for manufacturing a twisted carbon fiber (TCF) porous aerogel, the method comprising:
   (i) providing cotton comprising fibers having a twisted structure; and
   (ii) heating the cotton under inert gas atmosphere and at a reduced pressure of about 0.1 mbar to about 500 mbar to any temperature of up to 900 °C wherein “about” means the value it relates to ±10%.

2. Method according to claim 1, wherein the cotton comprises cellulose of Formula (I)



Formula (I)

wherein,
n is from 25 to 10.000, preferably from 50 to 5.000, and
R^1 is hydrogen.

3. Method according to claim 1 or 2, wherein step (ii) is conducted at a pressure of about 0.25 mbar to about 250 mbar, or of about 0.5 mbar to about 100 mbar wherein “about” means the value it relates to ±10%.

4. Method according to any one of claims 1 to 3, wherein step (i) comprises washing and/or drying the cotton.

5. Method according to claim 4, wherein deionized water is used for washing in step (i).

6. Method according to claim 4 or 5, wherein drying in step (i) is conducted at a temperature from about 10 °C to about 200 °C, from about 20 °C to about 150 °C, or from about 40 °C to about 90 °C wherein “about” means the value it relates to ±10%.

7. Method according to any one of claims 4 to 6, wherein drying is conducted under vacuum.

8. Method according to any one of claims 1 to 7, wherein

- the reaction temperature of step (ii) is from about 200 °C to about 900 °C, from about 400 °C to about 900 °C, from about 600 °C to about 900 °C, from about 700 °C to about 900 °C, from about 750 °C to about 850 °C or about 800 °C wherein “about” means the value it relates to ±10%, and/or
- the reaction time of step (ii) is from about 0.1 hour to about 12 hours, from about 0.1 hour to about 8 hours, from about 0.25 hour to about 6 hours, from about 0.5 hour to about 4 hours, from about 1 hour to about 3 hours, or about 2 hours wherein “about” means the value it relates to ±10%.

9. Method according to any one of claims 1 to 8, wherein the heating rate in step (ii) is from about 0.1 °C/min to about 20 °C/min, from about 1 °C/min to about 15 °C/min, from about 1.5 °C/min to about 10 °C/min, from about 2 °C/min to about 8 °C/min, from about 4 °C/min to about 6 °C/min, or about 5 °C/min wherein “about” means the value it relates to ±10%.

10. Method according to any one of claims 1 to 9, wherein the method in step (i) comprises pretreating the cotton, wherein pretreating preferably comprises pretreating the cotton with water and/or an aqueous solution, wherein the aqueous solution optionally comprises an acid, optionally being selected from the group consisting of hydrochloric acid, sulfuric acid, phosphorous acid, nitric acid, acetic acid, and mixtures thereof.

11. Method according to claim 10, wherein the acid is hydrochloric acid.

12. Method according to claim 10 or 11, wherein the pretreating time is about 0.1 hour to about 80 hours, about 1 hour to about 72 hours, or about 6 hours to about 60 hours wherein “about” means the value it relates to ±10%.

13. Twisted carbon fiber (TCF) porous aerogel obtainable by the method according to any one of claims 1 to 12.

14. Use of the twisted carbon fiber (TCF) porous aerogel according to claim 13 for the treatment of waste water, wherein treating the waste water preferably comprises bringing the twisted carbon fiber (TCF) porous aerogel into contact with the waste water, the waste water optionally comprising water and an organic liquid contaminant.

15. Method for the treatment of waste water, comprising
(i) contacting the twisted carbon fiber (TCF) porous aerogel according to claim 13 with the waste water; and
(ii) separating the treated waste water from the twisted carbon fiber (TCF) porous aerogel.