Generally, treatment with hypochlorous acid is considered to be destructive to cellulose strength. In addition to that, the carbonyl and carboxyl contents in the cellulose can contribute to the color change after some period due to its instability.

Accordingly, there remains a need in the art for suitable methods which provide cellulose fibers with both improved mechanical properties and optical properties. Additionally, there is also need for such methods to be carried out in an environmentally friendly and sustainable way. The present invention was developed at least with the aim of addressing these problems and/or with at least the aim to provide a commercially useful alternative.

Summary

In one aspect, there is provided a method of treating regenerated cellulose fiber for use as a fiber feedstock, the method comprising providing a fiber feedstock comprising regenerated cellulose fiber and treating it in the following steps: (a) contacting the fiber feedstock with a first aqueous solution comprising a reducing agent; (b) contacting the fiber feedstock with a second aqueous solution having a pH of greater than 7 and comprising sodium hypochlorite; wherein step (a) is performed before step (b).

In another aspect, there is provided a use of a treated fiber feedstock comprising treated cellulose fiber obtained by the method as described herein in the manufacture of a textile fabric and/or for non-woven applications.

Description of the Invention

In a first aspect of the present invention, there is provided a method of treating regenerated cellulose fiber for use as a fiber feedstock, the method comprising providing a fiber feedstock comprising regenerated cellulose fiber and treating it in the following steps:

(**a**) contacting the fiber feedstock with a first aqueous solution comprising a reducing agent;

(**b**) contacting the fiber feedstock with a second aqueous solution having a pH of greater than 7 and comprising sodium hypochlorite;

wherein step (**a**) is performed before step (**b**) or wherein step (**b**) is performed before step (**a**).

In accordance with a further aspect, there is provided a treated fiber feedstock comprising treated cellulose-based fiber obtained by the method described herein. In another aspect, there is also

provided the subsequent use of such a treated fiber feedstock in the manufacture of a textile fabric or in non-woven applications.

The present disclosure will now be described further. In the following passages, different aspects/embodiments of the disclosure are defined in more details. Each aspect/embodiment so defined may be combined with other aspect/embodiment or aspects/embodiment unless clearly indicated to the contrary. In particular, any feature indicated as being preferred or advantageous may be combined with other feature indicated as being preferred or advantageous.

Claims:

1. A method of treating regenerated cellulose fiber for use as a fiber feedstock, the method comprising providing a fiber feedstock comprising regenerated cellulose fiber and treating it in the following steps:

(a) contacting the fiber feedstock with a first aqueous solution comprising a reducing agent;

(b) contacting the fiber feedstock with a second aqueous solution having a pH of greater than 7 and comprising sodium hypochlorite;

wherein step (a) is performed before step (b).

2. The method according to claim 1, wherein the regenerated cellulose fiber comprises viscose, Lyocell, modal, cupra, phosphoric acid cellulose, cellulose nitrates, ethers and esters, cold caustic dissolution, high tenacity rayon, high wet modulus (HWM) rayon, polynosic fiber, carbamate fiber, ionic liquid fiber and deep eutectic solvent (DES) fiber, preferably viscose and/or Lyocell fiber.

3. The method according to claim 1 or claim 2, wherein the reducing agent is selected from the group consisting of: sulfur dioxide, oxalic acid, bis[tetrakis(hydroxymethyl)phosphonium] sulfate, lithium borohydride, sodium borohydride, sodium hydrosulfide, sodium dithionite, sodium dithionate, and combinations thereof, preferably selected from the group consisting of: lithium borohydride, sodium borohydride, sodium dithionite, sodium dithionate, and combinations thereof.

4. The method according to any one of the preceding claims, wherein the first and/or second aqueous solution has a pH of greater than 7, preferably greater than 9 and/or less than 14.

5. The method according to any one of the preceding claims, wherein the first aqueous solution and/or the second aqueous solution comprises sodium hydroxide.

6. The method according to any one of the preceding claims, wherein the fiber feedstock comprises greater than 50 wt% cellulose fiber by weight of the fiber feedstock, preferably greater than 75 wt%.

7. The method according to any one of the preceding claims, wherein the fiber feedstock is mixed with the first aqueous solution, and/or the second aqueous solution, for at least 1 minute.

8. The method according to any one of the preceding claims, wherein the fiber feedstock is mixed with the first aqueous solution, and/or the second aqueous solution, at a temperature of at least 40°C and/or at most 80°C.

9. The method according to any one of the preceding claims, wherein the first aqueous solution comprises the reducing agent in an amount of at least 0.1 wt% and/or at most 10 wt% by weight of the fiber feedstock, preferably at least 1 wt%.

10. The method according to any one of the preceding claims, wherein step (a) further comprises recovering the fiber feedstock by filtration to separate out the first aqueous solution as a permeate.

11. The method according to claim 10, wherein the permeate is recycled in step (a) and mixed with fiber feedstock.

12. The method according to claim 10 or claim 11, wherein the permeate is recycled as a feedstock in the Kraft process, preferably wherein the reducing agent comprises lithium or sodium borohydride.

13. The method according to any one of the preceding claims, wherein step (b) further comprises recovering the fiber feedstock by filtration to separate out the second aqueous solution as a permeate.

14. The method according to any one of the preceding claims, wherein the second aqueous solution comprises sodium hypochlorite in an amount of at least 0.1 g/L, preferably at least 1 g/L, and/or at most 5 g/L, preferably at most 3 g/L.

15. The method according to any one of the preceding claims, wherein the second aqueous solution comprises sodium hypochlorite in an amount of at least 0.5 wt% and/or at most 5 wt% by weight of the fiber feedstock.

16. The method according to any one of the preceding claims, wherein each of the tenacity and the whiteness of the fiber feedstock obtained after steps (a) and (b) is the same or greater than that of a treated fiber feedstock obtained from step (b) only.

17. The method according to any one of the preceding claims, wherein the treated cellulose fiber has a tenacity of at least 2.42 cN/dtex and a whiteness of at least 80%.

18. The method according to any one of the preceding claims, wherein the method comprises use of a viscose or Lyocell process to provide the fiber feedstock comprising cellulose fiber for use in steps (a) and (b).

19. Use of a treated fiber feedstock comprising treated cellulose fiber obtained by the method according to any one of the preceding claims in the manufacture of a textile fabric and/or for non-woven applications.