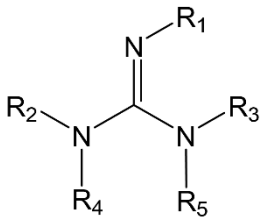
CLAIMS

1. A method of reversibly dissolving cellulose in an organic solvent comprising:

mixing a solution comprising dimethyl sulfoxide and cellulose with an organic base in the presence of carbon dioxide, wherein the organic base is represented by a formula of:



wherein each of R_1, R_2 and R_3 is C_1-C_{20} alkyl;

wherein each of R_4 and R_5 is hydrogen or C_1-C_{20} alkyl; and

maintaining the presence of carbon dioxide to form a transparent solution comprising dissolved cellulose in the form of cellulose carbonate anions,

wherein the mixing and the maintaining steps are carried out at a temperature of 20°C to 40°C.

2. The method according to claim 1, further comprising reducing the presence of carbon dioxide to convert the cellulose carbonate anions into cellulose when needed.

3. The method according to claim 1 or 2, wherein the organic base comprises 2-tert-butyl-l,l,3,3-tetramethylguanidine (BTMG), 1,2,3-triisopropylguanidine (TIPG), 2-butyl-1,3-diisopropylguanidine (BDPG), or their combination thereof.

4. The method according to any one of claims 1 to 3, wherein the organic base is BTMG.

5. The method according to any one of claims 1 to 4, wherein the cellulose comprises microcrystalline cellulose, amorphous cellulose or cotton.

6. The method according to claim 1, wherein the mixing is carried out at a temperature of 22°C.

7. The method according to any one of claims 1 to 6, wherein the carbon dioxide has a pressure of at least 1 atm (101,325 Pa).

8. The method according to claim 7, wherein the pressure is 1 atm (101,325 Pa) to 20 atm (2,026,500 Pa).

9. The method according to claim 7 or 8, wherein the pressure is 1 atm (101,325 Pa).

10. The method according to any one of claims 1 to 9, wherein the mixing is carried out based on a molar ratio of organic base to cellulose-OH ranging from 0.50 to 3.00.

11. The method according to any one of claims 1 to 10, wherein the transparent solution further comprises cellulose-O^- anions and/or a protonated form of the organic base.

12. The method according to claim 11, wherein the protonated form of the organic base comprises $[BTMG-H]^+$.

13. The method according to claim 1, further comprising adding water or an alcohol to the transparent solution to precipitate the dissolved cellulose.

14. The method according to claim 13, wherein the alcohol comprises methanol or ethanol.

15. The method according to claim 13 or 14, wherein the precipitated cellulose has a lower crystallinity compared to the crystalline cellulose before dissolving in the organic solvent.