CLAIMS

1. A process for preparing a functionalised polymeric chromatography medium, which process comprises

(I) providing two or more non-woven sheets stacked one on top of the other, each sheet comprising one or more polymer nanofibres,

(II) simultaneously heating and pressing the stack of sheets to fuse points of contact between the nanofibres of adjacent sheets, and

(III) contacting the pressed and heated product with a reagent which functionalises the product of step (II) as a chromatography medium.

2. A process according to Claim 1, in which between two and thirty sheets are stacked one on top of the other in step (I).

3. A process according to Claim 1 or 2, in which between five and twenty five sheets are stacked one on top of the other in step (I).

4. A process according to Claim 1, 2 or 3, in which a pressure of from 0.01 to 5MPa is applied to the stack of sheets in step (II).

5. A process according to any of Claims 1 to 3, in which a pressure of greater than 1kPa is applied to the stack of sheets in step (II).

6. A process according to any preceding claim, in which a pressure of not greater than 500kPa is applied to the stack of sheets in step (II).

7. A process according to any preceding claim, in which each non woven sheet consists of a single polymer nanofibre, or comprises 2, 3, 4, 5, 6, 7, 8, 9 or 10 polymer nanofibres.

8. A process according to any preceding claim, in which the polymer is selected from the group consisting of cellulose, cellulose acetate, polysulfones, polyamides, polyacrylic acid, polymethacrylic acid, polyacrylonitrile, polystyrene, polyethylene oxide, and mixtures thereof.

9. A process according to any preceding claim, in which the nanofibres are cellulose acetate nanofibres, and the pressed and heated product is treated between steps (II) and (III) to convert the cellulose acetate to cellulose.

10. A process according to Claim 9, in which the stack of sheets is heated at a temperature between 190 and 220°C in step (II).

11. A process according to any preceding claim, step (III) comprising contacting the pressed and heated product in a batchwise fashion at least two times with a reagent which functionalises the pressed and heated product as a chromatography medium.

12. A process according to Claim 11, each step of contacting with a reagent in a batchwise fashion comprising (a) contacting with the reagent, (b) isolating the product of step (a) from the reagent, (c) optionally treating the product of step (b) with aqueous alkali, and (d) optionally washing the product of step (b) or the optional product of step (c) with water.

13. A process according to Claim 11 or 12, batchwise functionalisation being carried out between two and four times.

14. A process according to any of Claims 1 to 10, step (III) comprising placing the pressed and heated product in a holder, and (IV) causing a reagent to flow through the holder so that the reagent flows in contact with the pressed and heated product which functionalises the product of step (II) as a chromatography medium.

15. A process according to Claim 14, in which step (IV) comprises

- causing a reagent to flow through the holder under pressure; and/or
- causing a reagent to flow through the holder using a pump; and/or
- causing a reagent to flow through the holder in a cyclical manner; and/or
- causing a reagent to flow through the holder for a period of time from 1 to 20 minutes.

16. A process according to any preceding claim, in which the reagent functionalises the pressed and heated product so that the resultant functionalised chromatography medium is suitable for use in a chromatography method chosen from the group consisting of ion exchange, affinity capture, hydrophobic interaction and mixed mode methods.

17. A process according to Claim 16, in which

- the chromatography method is a cationic exchange method, and the reagent functionalises the chromatography medium with a carboxylate, sulphonate or phosphonate group;

- the chromatography method is an anionic exchange method, and the reagent functionalises the chromatography medium with a quaternary amino or diethylamine group;

- the chromatography method is an affinity capture chromatography method, and the reagent functionalises the chromatography medium with a protein, Protein A, Protein G, Protein L, peptide, antibody or fragment thereof, dye, histidine, group containing a metal cation, or mimetic or synthetic ligand that mimics the action of a protein ligand;

- the chromatography method is a hydrophobic interaction chromatography method, and the reagent functionalises the chromatography medium with a propyl, butyl, phenyl, or octyl group; or

- the chromatography method is a mixed mode chromatography method, and the reagent functionalises the chromatography medium with a MEP, octylamine, N-benzyl methyl ethanolamine or N-benzoyl-homocysteine group.

18. A process according to any preceding claim, in which the reagent functionalises a hydroxyl, amino or carboxylic acid group on the chromatography medium.

19. A process according to any preceding claim, in which the pressed and heated product is treated to deprotect or activate any functional groups on the polymer prior to the step of contacting with a reagent.

20. A process according to any preceding claim, in which

- between five and twenty five sheets are stacked one on top of the other in step (I), each sheet comprising 1, 2 or 3 polymer nanofibres, and each sheet having a thickness of from 5 to 40μm, and/or

- in step (II) a temperature below the melting point of the polymer and a pressure of from 0.01 to 5MPa are applied for 1 to 120 minutes so as to obtain a pressed and heated product having an average density of 250 to 750 kg/m3 and a thickness of 0.05 to 10mm.

21. A process according to any of Claims 1 to 19, in which

- between five and twenty sheets are stacked one on top of the other in step (I), each sheet consisting of a single polymer nanofibre, and each sheet having a thickness of from 5 to 120μm and an area density of from 1 to 40 g/m2, and/or

- in step (II) a temperature below the melting point of the polymer and a pressure of from 1 to 500kPa are applied for 1 to 30 minutes so as to obtain a pressed and heated product having an average density of 200 to 1000 kg/m3 and a thickness of 0.05 to 10mm.

22. A functionalised chromatography medium obtainable by a process according to any preceding claim.

23. A process for preparing a chromatography cartridge, which process comprises carrying out a process according to any of Claims 1 to 21 and incorporating the thus-obtained product into a cartridge.

24. A chromatography cartridge which (a) is obtainable by a process according to Claim 23, or (b) which comprises one or more functionalised chromatography media according to Claim 22.

25. Use of a functionalised chromatography medium according to Claim 22 or a chromatography cartridge according to Claim 24 in chromatography.

26. A process for isolating one or more biological molecules from a mobile phase, which process comprises contacting one or more biological molecules in a mobile phase with a functionalised chromatography medium according to Claim 22 or a chromatography cartridge according to Claim 24.

27. A process according to Claim 26 which is an ion exchange, affinity capture or hydrophobic interaction chromatography process.

28. A process according to Claim 26, in which the one or more biological molecules are one or more proteins, polypeptides, antibodies, amino acids, viruses, nucleic acids, recombinant proteins, monoclonal antibodies, viral vaccines or plasmid DNA.