

CLAIMS

1. A method for preparing a porous scaffold which comprises the steps consisting of :
 - a) preparing an alkaline aqueous solution comprising an amount of at least one polysaccharide, an amount of a covalent cross-linking agent and an amount of a porogen agent
 - b) transforming the solution into a hydrogel by placing said solution at a temperature from about 4°C to about 80°C for a sufficient time to allow the cross-linking of said amount of polysaccharide
 - c) submerging said hydrogel into an aqueous solution
 - d) washing the porous scaffold obtained at step c).
2. The method of claim 1 wherein said polysaccharide is selected from the group consisting of dextran, agar, alginic acid, hyaluronic acid, pullulan, inulin, heparin, fucoidan, chitosan and mixtures thereof .
3. The method according to any one of claims 1 to 2 wherein said covalent cross-linking agent is selected from the group consisting of trisodium trimetaphosphate (STMP), phosphorus oxychloride (POCl_3), epichlorohydrin, formaldehydes, hydrosoluble carbodiimides, and glutaraldehydes..
4. The method according to any of claims 1 to 3 wherein the porogen agent is selected in the group consisting of ammonium carbonate, ammonium bicarbonate, calcium carbonate, sodium carbonate, and sodium bicarbonate and mixtures thereof and the liquid of step b) is an acidic solution.
5. The method according to any of claims 1 to 4 wherein the weight ratio of the polysaccharide to the porogen agent is in the range from 6:1 to 1:1.

6. The method according to any of claims 1 to 5 wherein the weight ratio of the polysaccharide to the cross-linking agent is in the range from 15:1 to 1:1.
7. The method according to any one of claims 1 to 6 wherein the solution of step a) is poured in a mould before step b).
- 5 8. The method according to any one of claims 1 to 7 wherein said scaffold is shaped.
9. A porous scaffold obtainable by the method according to any one of claims 1 to 8.
- 10 10. The porous scaffold of claim 9 wherein the size of the pores is comprised between 1 μm and 500 μm .
11. The porous scaffold according to claim 9 or 10 wherein the porosity is in the range from 4% to 50%.
12. The porous scaffold according to any one of claims 9 to 11 loaded with an amount of cells.
- 15 13. The porous scaffold according to claim 12 wherein the cells are selected in the group consisting of yeast cells, mammalian cells, insect cells, and plant cells.
- 20 14. The porous scaffold according to claim 13 wherein mammalian cells are selected from the group consisting of chondrocytes; fibrochondrocytes; osteocytes; osteoblasts; osteoclasts; synoviocytes; bone marrow cells; epithelial cells, hepatocytes, mesenchymal cells; stromal cells; muscle cells, stem cells; embryonic stem cells; precursor cells derived from adipose tissue; peripheral blood progenitor cells; stem cells isolated from adult tissue; and genetically transformed cells.
- 25 15. The porous scaffold according to any one of claims 9 to 14 for tissue engineering, cell culture and cell delivery.

16. A vascular substitute made with a scaffold as defined according to any one of claims 9 to 12.
17. Cartilage or bone implants made with a scaffold as defined according to any one of claims 9 to 12.
- 5 18. Use of a scaffold as defined according to any one of claims 9 to 12 for the evaluation of the toxicity and/or pharmacology of a product.
19. A controlled release system of an active agent made with a scaffold as defined according to any one of claims 9 to 12.

CLAIMS

1. A method for preparing a porous scaffold which comprises the steps consisting of :

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a) preparing an alkaline aqueous solution comprising an amount of at least one polysaccharide, an amount of a covalent cross- linking agent and an amount of a porogen agent

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b) transforming the solution into a hydrogel by placing said solution at a temperature from 4°C to 80°C for a sufficient time to allow the cross-linking of said amount of polysaccharide

c) submerging said hydrogel into an aqueous solution

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d) washing the porous scaffold obtained at step c).

2. The method of claim 1 wherein said polysaccharide is selected from the group consisting of dextran, agar, alginic acid, hyaluronic acid, pullulan, inulin, 20 heparin, fucoidan, chitosan and mixtures thereof .

3. The method according to any one of claims 1 to 2 wherein said covalent cross-linking agent is selected from the group consisting of trisodium trimetaphosphate (STMP), phosphorus oxychloride (POCl_3), epichlorohydrin, 25 formaldehydes, hydrosoluble carbodiimides, and glutaraldehydes.

4. The method according to any one of claims 1 to 3 wherein said covalent cross-linking agent is trisodium trimetaphosphate (STMP).

5. The method according to any of claims 1 to 4 wherein the porogen agent is selected in the group consisting of ammonium carbonate, ammonium bicarbonate, calcium carbonate, sodium carbonate, and sodium bicarbonate and mixtures thereof and the liquid of step b) is an acidic solution.
- 5 6. The method according to any of claims 1 to 5 wherein the weight ratio of the polysaccharide to the porogen agent is in the range from 6:1 to 1:1.
7. The method according to any of claims 1 to 6 wherein the weight ratio of the polysaccharide to the cross-linking agent is in the range from 15:1 to 1:1.
- 10 8. A porous scaffold obtainable by the method according to claim 4.
9. The porous scaffold of claim 8 wherein the size of the pores is comprised between 1 μm and 500 μm .
- 15 10. The porous scaffold according to claim 8 or 9 wherein the porosity is in the range from 4% to 50%.
- 20 11. The porous scaffold according to any one of claims 8 to 10 loaded with an amount of cells, preferably selected in the group consisting of yeast cells, mammalian cells, insect cells, and plant cells.
12. The porous scaffold according to claim 11 wherein the cells are mammalian cells selected from the group consisting of chondrocytes; fibrochondrocytes; osteocytes; osteoblasts; osteoclasts; synoviocytes; bone marrow cells; epithelial cells, hepatocytes, mesenchymal cells; stromal cells; muscle cells, stem cells; embryonic stem cells; precursor cells derived from adipose tissue; peripheral blood progenitor cells; stem cells isolated from adult tissue; and
- 25 30 genetically transformed cells.

13. The porous scaffold according to any one of claims 8 to 12 for tissue engineering, cell culture and cell delivery.
14. A vascular substitute made with a scaffold as defined according to any one
5 of claims 8 to 11.
15. Cartilage or bone implants made with a scaffold as defined according to any one of claims 8 to 11.
- 10 16. Use of a scaffold as defined according to any one of claims 8 to 11 for the evaluation of the toxicity and/or pharmacology of a product.
17. A controlled release system of an active agent made with a scaffold as defined according to any one of claims 8 to 11.