Claims

1) A method for promoting stem cell chondrogenesis, comprising the step of culturing a population of stem cells on a plurality of imprints disposed on a biocompatible polymer substrate, said imprints being configured to selectively promote chondrogenesis of said stem cells.

2) The method according to claim 1, wherein said imprints are arranged in an ordered manner on said biocompatible polymer substrate.

3) The method according to claim 1 or claim 2, wherein said imprints are in the nano-scale.

4) The method according to claim 2 or claim 3, wherein said imprints are arranged in an ordered array on said biocompatible polymer substrate such that the distance between adjacent imprints is of a set value.

5) The method according to any one of the preceding claims, wherein said imprints are formed on said biocompatible polymer substrate using thermal nanoimprinting or nanoimprint lithography.

6) The method according to any one of the preceding claims, comprising the step of coating said imprints with a chondrogenic inducing agent.

7) The method according to claim 6, wherein said chondrogenic inducing agent is selected from the group consisting of chondroitin sulphate, serum-free DMEM, ascorbate, dexamethasone, L-proline, sodium pyruvate,

antibiotics and recombinant human transforming growth factor β1.

8) The method according to claim 3, wherein said nano-imprint is selected from the group consisting of nano-pillar, nano-hole, nano-grill, nano-wire and nano-tube.

9) The method according to any one of the preceding claims, wherein said biocompatible polymer substrate is a biocompatible polymer selected from the group consisting of carbomer, polyalkylene glycol, poloxamer, polyester, polyether, polyanhydride, polyacrylate, polyvinyl acetate, polycarbonate, polyvinyl pyrrolidone, poly carboxylic acid, poly hydroxyacid, polygalpolysaccharide, polycarbonate, mixtures and copolymers of the polymers and monomers thereof.

10) The method according to claim 9, wherein said biocompatible polymer is selected from the group consisting of polycaprolactone, polymethyl methacrylate, polycarbonate, polylactic acid and poly(lactic-co-glycolic acid).

11) The method according to any one of the preceding claims, wherein said stem cells are selected from the group consisting of mesenchymal stem cells, neural stem cells, haemopoietic stem cells, endothelial stem cells and adipose-derived stem cells.

12) The method according to any one of the preceding claims, wherein when nano-pillars or nano-holes are used, said stem cells selectively differentiate into cells with high chondrogenic potential and when nano-

grills are used, said stem cells selectively differentiate into cells with low chondrogenic potential when compared to stem cells cultured on a substrate not having any imprints thereon.

13) A cartilage graft comprising a population of stem cells differentiated chondrocytes disposed on a plurality of imprints on a biocompatible polymer substrate, said imprints being arranged in an ordered manner and configured to selectively promote chondrogenesis of said stem cells.

14) The cartilage graft according to claim 13, wherein said imprint is a nano-imprint selected from the group consisting of nano-pillar, nano-hole, nano-grill, nano-wire and nano-tube.

15) The cartilage graft according to claim 13 or claim 14, wherein said ~~substrate is a~~ biocompatible polymer is selected from the group consisting of carbomer, polyalkylene glycol, poloxamer, polyester, polyether, polyanhydride, polyacrylate, polyvinyl acetate, polycarbonate, polyvinyl pyrrolidone, poly carboxylic acid, poly hydroxyacid, polygalpolysaccharide, polycarbonate, mixtures and copolymers of the polymers and monomers thereof.

16) The cartilage graft according to any one of claims 13 to 15, wherein said stem cells are selected from the group consisting of mesenchymal stem cells, neural stem cells, haemopoietic stem cells, endothelial stem cells and adipose-derived stem cells.

17) The cartilage graft according to any one of claims 13 to 16, wherein said chondrocytes have a