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(54) Title: BIOMIMETIC COLLAGEN-HYDROXYAPATITE COMPOSITE MATERIAL

FIG 3



(57) Abstract: The invention relates to: - a biomimetic collagen-hydroxyapatite composite material comprising an at least partially fibrous collagen scaffold including mature native collagen fibers possessing triple helicity as shown by Circular Dichroism Spectroscopy, wherein those mature native collagen fibers are at least partially covered with epitactically grown crystals of nanocrystalline hydroxyapatite, whereby the epitactically grown nanocrystals have the same morphology as human bone mineral and the same size as human bone mineral, i.e. a length of 30 to 50 nm and a width of 14 to 25 nm, - a process of preparing the above biomimetic collagen-hydroxyapatite composite material comprising the steps of a) immersing an at least partially fibrous collagen scaffold including the above mature native collagen fibers in a saturated aqueous solution of saturated Ca^{2+} / $\text{Hx-PO}_4^{(3-x)}$ to start the formation process of the composite implant material whereby epitactically grown nanocrystals will be formed on the mature native collagen fibers, the epitactically grown nanocrystals having the same morphology and same size as human bone mineral, b) stopping the formation process of the composite implant material by separating solid material from the aqueous solution, rinsing with water and drying, and c) optionally sterilizing the separated material coming from step b), as well as - the use of the above biomimetic collagen-hydroxyapatite composite material as an implant or prosthesis for bone formation, bone regeneration, bone repair and/or bone replacement at a defect site in a human subject or in an animal, or as an implant for com-

bined bone and cartilage regeneration.