



(51) International Patent Classification:

A61L 27/44 (2006.01) A61L 27/36 (2006.01)
A61L 27/48 (2006.01)

(21) International Application Number:

PCT/IN2017/000079

(22) International Filing Date:

13 April 2017 (13.04.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

201611012973 13 April 2016 (13.04.2016) IN

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,

HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with amended claims (Art. 19(1))

(88) Date of publication of the international search report:

23 November 2017 (23.11.2017)

Date of publication of the amended claims:

05 July 2018 (05.07.2018)

(54) Title: NANO-ENGINEERED BIORESORBABLE POLYMER COMPOSITE FOR BONE-SOFT TISSUE FIXATION APPLICATION

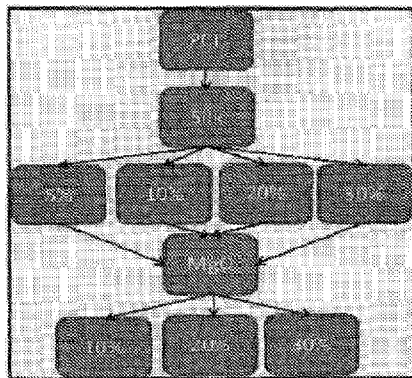


Figure : 1

(57) Abstract: A novel bioresorbable polymer composite for bone soft tissue fixation comprises: i) Silk fibroin→ 5 to 30% ii) a bioresorbable polymer matrix→40 to 90% iii) magnesium oxide or other ceramic fillers→5 to 30%.



AMENDED CLAIMS

received by the International Bureau on 06 December 2017 (06.12.2017)

WE CLAIM:

1. A novel bioresorbable polymer composite for bone soft tissue fixation comprises:

- i) silk fibroin → 5 to 30%
- ii) a bioresorbable polymer matrix → 40 to 90%
- iii) magnesium oxide or other ceramic fillers → 5 to 30%

2. The novel bioresorbable polymer composite as claimed in claim 1, wherein silk fibroin is extracted from *Bombyx mori* and degummed using Na₂CO₃ hot bath method.

3. The novel bioresorbable polymer composite as claimed in claim 1, comprising at least bioresorbable polymer selected from Polycaprolactone (PCL), poly (L-lactide) (PLLA), poly (D, L-lactide) (PLDLA), poly (lactide-co-glycolide) (PLGA), poly (glycolide-co-trimethylene carbonate) (PGA-TMC), Polydioxanone (PDO).

4. The novel bioresorbable polymer composite as claimed in claim 1, wherein the said filler is selected from Magnesium Oxide (MgO), Hydroxyapatite (HA), β-Tricalcium phosphate (β-TCP), silicon dioxide (SiO₂), Calcium oxide (CaO), Calcium Carbonate (CaCO₃), calcium trisilicate, Magnesium calcium trisilicate, calcium containing compounds such as mono, di, octa, tri calcium phosphate, preferably MgO.

5. The polymer composite as claimed in claim 1, optionally comprising a bioactive glass comprising metal oxides such as calcium oxide, silicon dioxide, sodium oxide and mixture thereof.

6. A method of preparing the polymer composite as claimed in claim 1, comprising the steps of:

- chopping silk fibers into small pieces;
- mixing of chopped silk fibers, MgO nanoparticles powder with pre-dried PCL polymer pellets;

- mixing of different concentration of MgO filler with silk fibers in different concentrations to obtain the novel bioresorbable polymer composite.

7. The method as claimed in claim 6, wherein said concentration of silk fibers in the polymer composite is from 5% to 30%.

8. The method as claimed in claim 6, wherein mixing of silk fibers and MgO filler with PCL takes place at a speed of 100-200rpm, duration of 10-20 min and temperature of 140-180°C respectively.