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Natural plant-derived polymer fabricated with sugar-containing hydroxyapatite for biocompatible bone-hemostasis

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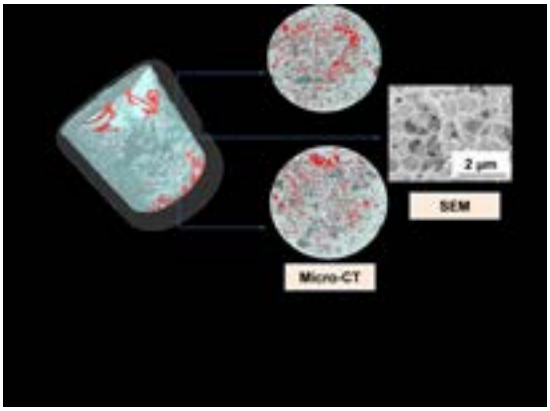
The preparation conditions of bone-hemostasis materials were examined using hydroxyapatite (Ca10(PO4)6(OH)2: HAp) and natural plant-derived polymer(guar gum(GG), locust bean gum(LBG) and sodium alginate(AG)). The starting gel was prepared by dissolving 2 mass% 80LBG-20GG and 2 mass% AG into deionized water heated at 60°C (80LBG-20GG/AG). The resulting gels were vigorously agitated with 20,000 rpm for 3 min. Further, the gel was immersed into 3 mass% phosporyl oligosaccharides of calcium (POs-Ca®50) solution at room temperature for 24 h. Then, the resulting gel was hydrothermally-treated 100°C for 5 h and freeze-dried at -50°C for 24 h to form s-HAp in the material. According to the X-ray diffractometry (XRD), Fourier transform infrared spectrometry (FT-IR) and confirmed by the terahertz spectroscopy, the resulting composite contained hydrolyzed materials of POs-Ca, i.e., the sugar-containing HAp (s-HAp), as well as LBG and GG. According to the micro-computed tomography (micro-CT) and differential thermal analysis and thermogravimetry (DTA-TG), 16.8% of HAp could be homogeneously dispersed within the porous composite material. The pore sizes were approximately 1 to 2 μm determined by scanning electron microscopy (SEM). The present 80LBG-20GG/AG/s-HAp composite showed the noted porosity (81%; the measurement by micro-CT), absorption of simulated body fluid (1426%), adhesive strength (28.1 N) and hemostat time (7.5 h; the measurement by using simulated blood). The composite is also expected to assist the osteogenesis with its s-HAp. Overall, the composite of s-HAp and natural plant-derived polymer seems to be a promising material for the bone hemostasis and regeneration.



Biography

Yeonjeong Noh is a student of Sophia graduate school. Her research interest is the fabrication of bone hemostasis and bone regenerate properties with natural plant-derived polymer fabricated with hydroxyapatite.

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