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Preparation of a bioactive and degradable 70poly (40lactic-co-60glycoric acid)/30(75SiO₂-25CaO) composite with dual pore structure

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The bone grafting materials must have porous structure because it induces the growth of blood vessels into the material. Mooney et al. reported the method to produce porous structure in PLGA scaffold by the expansion of CO₂ gas in high pressure chamber. The CO₂ has some solubility in the PLGA. Thus, when the high pressure of CO₂ is applied to the PLGA scaffold and then released quickly, it becomes to expand in the PLGA matrix. Resultantly, the pores are developed at the places where the gas existed. However, the disadvantage of this method is that it is also hard to connect between the pores. Thus, the salt leaching method is combined together to make porous structure. However, there has been no report to apply this method to make a porous bioactive composite material. In this study, we prepared the PLGA/calcium silicate composite by the solvent casting method and then a gradient pore structure was introduced using the expansion of CO₂ gas in a high pressure chamber. The 70Poly(40Lactic-co-60Glycoric Acid)/30(75SiO₂-25CaO) composite, which have a gradient pore structure, was newly prepared by the expansion of carbon dioxide gas in the PLGA matrix. The bioactive 75SiO₂-

25CaO (in wt.%) particles were made by a sol-gel method from tetraethyl orthosilicate and calcium nitrate tetrahydrate under acidic condition followed by the heat treatment at 700°C for 1 h. The 70Poly (40Lactic-co-60Glycoric Acid)/30(75SiO₂-25CaO) composite was then prepared by a solvent casting. The composite was loaded into the high pressure chamber and then CO₂ gas was introduced achieving a final pressure of 15 MPa. After 3 days, the gas was released quickly and the gradient pore structure was developed. The samples were observed by FE-SEM and its bioactivity was tested in SBF.

Biography

SangHoon Rhee has completed his PhD at the age of 34 years from Seoul National University and postdoctoral studies from National Institute of Materials Science. He is the professor of School of Dentistry, Seoul National University. He has published more than 70 papers in reputed journals and has been serving as an editorial board member of International Journal of Biomaterials and Journal of Biotechnology and Biomaterials.

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