**Editorial**
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# Materials Used in Bone Tissue Engineering

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## Editorial

In bone tissue engineering, a variety of materials are used (BTE). Because of its antibacterial activity and biocompatibility, grapheme oxide (GO) is a viable choice for BTE. Using an electrophoresis technique, a new biomaterial consisting of GO, *agarose* and hydroxyapatite (HA) was created in this study. After 10 mA/10 h of electrophoresis treatment needle-like crystals with great purity were generated, according to the characterization of the synthesized biomaterial. The calcium-phosphate ratio was also close to that of thermodynamically stable HA. The colony forming units test revealed considerably fewer *Staphylococcus aureus* in the produced biomaterial containing 1.0 wt percent GO. The initial adhesion of MC3T3-E1 cells to the produced biomaterial was seen, demonstrating the biomaterial's safety for cell survival [1,2].

## Introduction

Regeneration Osteoporosis has become one of the most universal and complex skeletal disorders for postmenopausal women, the elderly and those associated with other medical conditions or as the result of certain therapeutic interventions, which now affects over 200 million people worldwide. Osteoporosis is characterized by low bone mass, poor bone strength and micro architectural deterioration of bone, which is attributed to an excessive osteoplastic bone restoration and a reduced capacity of osteoblasts to replace the resorbed bone. Under osteoporotic pathological condition, the patients may face increased risks of fractures and the bone defects resulted from fracture, metastasis bone tumor resection and arthroplasty revision of the knee and hip. However, much attention in both research and clinical study is focused on fracture prevention and in the development of therapeutic approaches for the enhancement of bone density and bone mass, less attention has been directed to the study of the osteoporotic bone regeneration, especially in the presence of grafted biomaterials [3].

Under osteoporotic pathological condition, the bone healing exhibits impaired angiogenesis at early stage, impaired osteogenesis at middle stage and impaired remodeling at late stage. Therefore, an ideal biomaterial for osteoporotic bone regeneration should possess the abilities to promote osteogenesis and angiogenesis meanwhile inhibit osteoclastogenesis. Our previous studies have shown that Ca, Mg, Si containing akermanite bioceramics ($Ca_2MgSi_2O_7$) could induce osteogenic differentiation of osteoblasts, bone marrow stromal cells (BMSCs) and adipose-derived stem cells (ASCs) *in vitro* and enhance bone regeneration . Moreover, our recent studies also reported that akermanite bioceramics could improve NO synthesis and angiogenic gene expression of human aortic endothelial cells (HAECs) *in vitro* and enhance angiogenesis *in vivo*. However, the outcome of these studies is only based on healthy subjects and consequently does not provide information for akermanite bioceramics applied in osteoporotic bone regeneration. Moreover, our recent study showed that silicate based bioceramics could inhibit the expression of osteoclastogenic factors, which facilitated osteoporotic bone regeneration. It is suggested that akermanite bioceramics could repress the expression of osteoclastogenic factors of BMSCs under osteoporotic condition at early stage, which need to be confirmed. Moreover, as one of the key osteoclast differentiation factors, receptor activator of nuclear factor-kappa B ligand (RANKL) could mediate osteoclastogenesis and play an essential role in osteoclast differentiation. However, whether akermanite bioceramics could inhibit RANKL-mediated osteoclastogenesis at late stage, needs to be systematically investigated *in vitro* [3-5].

## Conflict of Interest

The authors declare that there is no conflict of interest associated with this manuscript.

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