

# Fabrication of Ag substituted octacalcium phosphate with antibacterial property and its biological evaluation

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Due to the increasingly aging worldwide population, maintaining mobility is an important aspect of continuing to engage in social activity. Bone defect reconstruction and regeneration are playing an essential role in maintaining people's quality of life. Octacalcium phosphate (OCP:  $\text{Ca}_8(\text{PO}_4)_4(\text{HPO}_4)_2 \cdot 5\text{H}_2\text{O}$ ) is the main component of immature bone and shows excellent biocompatibility when implanted into bone defects. Therefore, OCP has attracted attention as a new bone substitute. However, one serious drawback of bone substitute is no antibacterium ability, which has restricted its medical usage. Therefore, one infection occurred, it become an misary clinical case.

Ag is a classical antibacterium agent, then, it widely used. Although various studies investigated how attach Ag to bone substitute, free Ag ions make bone substitute to change color to blacky. This is an serious drawback for oral usage.

We have been investigating the effect of cationic ions for OCP substitution. Then, their ionic radii is an important factor for substitution. When the ionic radius of cation is similar to that of Ca, these ions could be substituted to OCP unit lattice. The ionic radius of Ag it  $\sim 1.00\text{\AA}$ , which is as same as that of Ca. Based on this knowledge, we fabricated Ag substituted OCP (OCP-Ag). When fabricated OCP-Ag immersed into medium, no color change was observed. In addition, OCP-Ag exhibited excellent antibacterium properties of oral bacterias such as *S. mutans*, *E. coli* and *S. aureus*. In this presentation, we would like to introduce how fabricate OCP-Ag and its biological properties.

Keywords: calcium phosphate, antibacterium agent, bone substitute, crystal engineering