

conditions of 1400 to 1450°C and a single phase, high purity α -tricalcium phosphate ceramic having a mole ratio of Ca/P of about 1.50 was obtained from β -tricalcium phosphate powder when sintered at conditions of 1150 to 1400°C. Further, depending on the conditions, it was also possible to fabricate a tricalcium phosphate ceramic with an α -phase at the surface and a β -phase inside. The relationship between the sintering temperature and phase is shown in Table 1.

Table 1

Sintering temperature (°C)	α-TCP β -TCP	β-TCP α -TCP
	Ceramic surface	After pulverization
1150	$\alpha+\beta$	$\alpha+\beta$
1200	$\alpha+\beta$	$\alpha+\beta$
1250	$\alpha+\beta$	$\alpha+\beta$
1300	α	$\alpha+\beta$
1350	α	$\alpha+\beta$
1400	α	α
1450	α	α

In the Table, the α -TCP and β -TCP are the α -tricalcium phosphate powder and β -tricalcium phosphate powder of the starting materials. "Ceramic surface" is the information of the powder X-ray diffraction from the surface of the sintered body, while "After pulverization" is the information from the powder after pulverization of the sintered body.

Next, the relative densities of α -type tricalcium phosphate ceramics obtained when sintering shaped articles of α -tricalcium phosphate powder at a fixed 1400°C, but changing the sintering time were found. The relative density increased along with the sintering time and that an approximately 95% dense body was obtained with a sintering time of 100 hours. (see Fig. 1)

Example 2

Alpha-tricalcium phosphate powder prepared by a wet

method was heat treated under pressure using a hot press under conditions of 80 MPa and 1350°C, whereupon a high purity α -tricalcium phosphate ceramic was obtained.

Example 3

5 Alpha-tricalcium phosphate powder, β -tricalcium phosphate powder, and amorphous tricalcium phosphate powder prepared by a wet method were made into slurries by adding 50% of water. These were then impregnated into polyurethane sponges, then dried and sintered at a
10 sintering temperature of 1400°C and a sintering time of 50 hours, whereupon high purity α -type tricalcium phosphate ceramics were obtained. These had sufficient practical strength as a bone filler ~~(see Fig. 1)~~.

Example 4

15 Dense bodies of α -tricalcium phosphate and hydroxyapatite cut into rectangular columns of 0.7 mm x 0.7 mm x 5 mm were implanted into the femur of osteophoresis model rats subjected to ovariectomies to observe the reaction with bone tissue. As a result, in
20 the case of α -tricalcium phosphate, new bone was formed directly around the specimen. There was no interposition of fibrous connecting tissue observed. The new bone and the material bonded directly. Further, the new bone
25 substantially completely covered the surface of the specimen and the rectangular column material became rounded, and therefore, there were signs of absorption over time and the possibility was suggested of complete disappearance with long term implantation (see Fig. 2).

On the other hand, in the case of the
30 hydroxyapatite, fibrous connecting tissue was formed around the specimen. There was little formation of new bone. Further, the shape of the article remained the same as at the time of implantation, and therefore, there was no sign of dissolution and it was believed that there
35 would be no absorption even with long-term implantation (see Fig. 3).

INDUSTRIAL APPLICABILITY