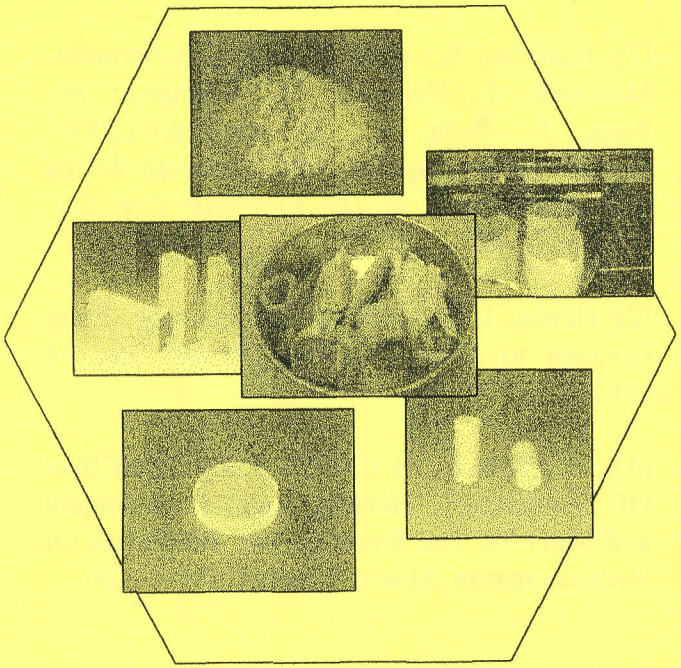
Biocompatible CBHA



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INTRODUCTION

Hydroxyapatite (HA, $Ca_5(PO_4)_3OH$) has been clinically approved to be very compatible with the surrounding tissue of vertebrates since its chemical compositions similar to human bone and teeth. Dense HA is one of bioactive implant material which could attach directly by chemical bonding with the bone in body.

HA produced from natural bone have advantage that it inherits some properties of the origin bone such as its chemical composition and structure. Unfortunately because of possibility risks from bacteria and viral infection or material degradation this practice is not widely followed. In the previous study, calcinations and firing for several hours could overcome this problem since no protein can survive a high temperature up to 800°C. However because of poor mechanical properties behaviour after firing at this temperature, some modification have to be carry out.

Methodology

Fig. 1 and 2 show experimental stages of this project. In this study a clean cow bones were calcined before ball milled until fine HA powder obtained. powder were mixed together with calgon and binder by ball milling in distilled water for 16 hours. the slurry was casting in pop mold to obtain hollow product whereas for dense product, the powder mixtures was sieved and granulated before pressing process in a bar steel die and sintered in air at temperature between 1150°c to 1300°c for a few hours.

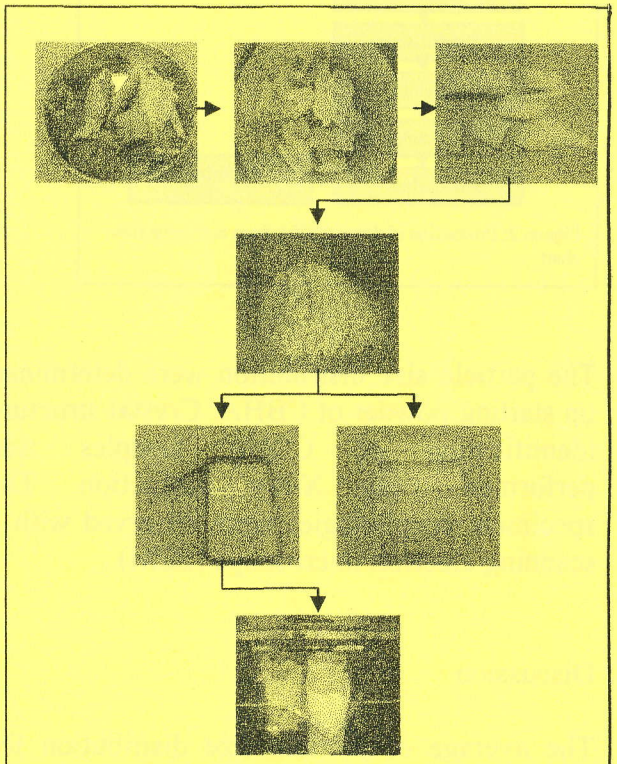

Fig. 1: Flow chart for CBHA fabrication

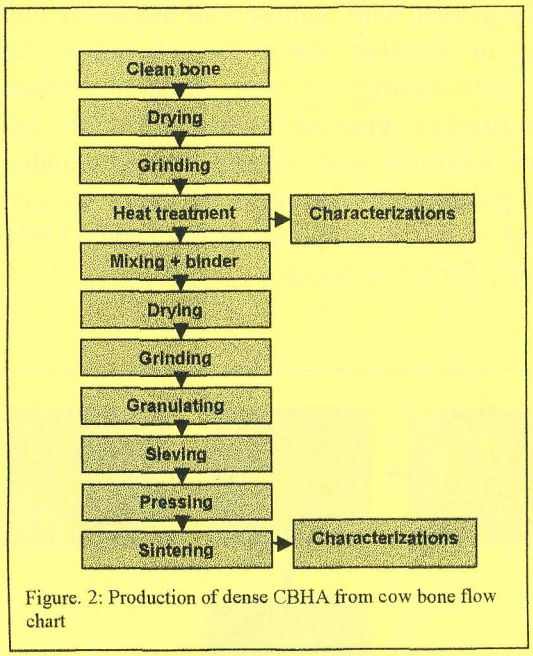

Figure. 2: Production of dense CBHA from cow bone flow chart

The particle size distribution were determined on starting powder of CBHA. Crystal structure identification of CBHA samples was performed using X-ray diffraction. The specimen morphologies were observed with a scanning electron microscope (SEM).

Discussion

The average of particle size distribution for CBHA was 12.751 μm and XRD results shows that CBHA phase was Hydroxyapatite with sharp intensity of crystalline pattern after calcinated at temperature 800°C up to 1150°C.

From microstructure observation using SEM, CBHA specimen shows initial stages of sintering at temperature 1150°C where necking between particles can be observed. This sintering process almost complete at temperature 1300°C and the average particle size distribution of ~2.5μm can be determined.

Applications

Fig. 3 shows some of HA applications in clinical uses.

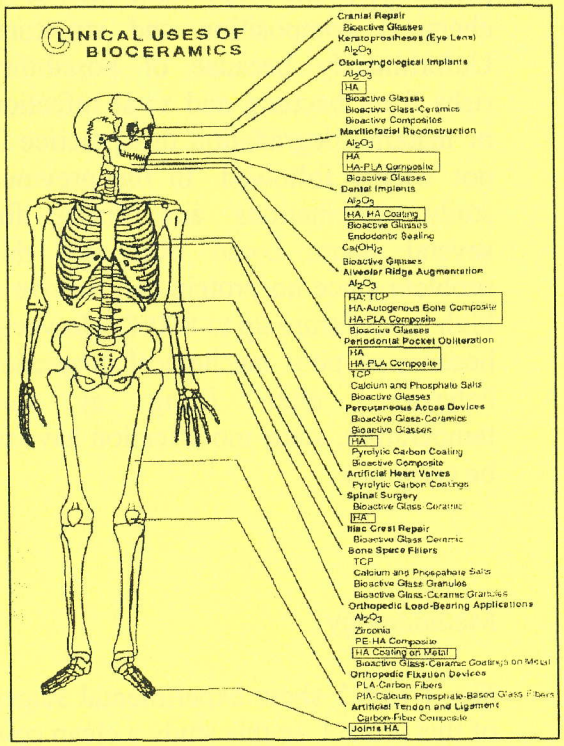

Figure 3: Some of clinical uses of hydroxyapatite

Acknowledgement

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Reference:

[1] Haberko, K., Bucko, M.M., Brzezinska-Miecznik, J., Haberko, M., Mosgava, W., Panz, T., Pyda, A., Jerzyzarebski. (2006). Natural Hydroxyapatite - Its behaviour during heat treatment. *J. of The European Cer. Soc.* [26]. 537-542

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