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ABSTRACTS

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Content

Poster: Ultrafine Grained Ceramics Based on Nanosized Powders, Synthesized from Calcium Acetate and Ammonium Hydrophosphate

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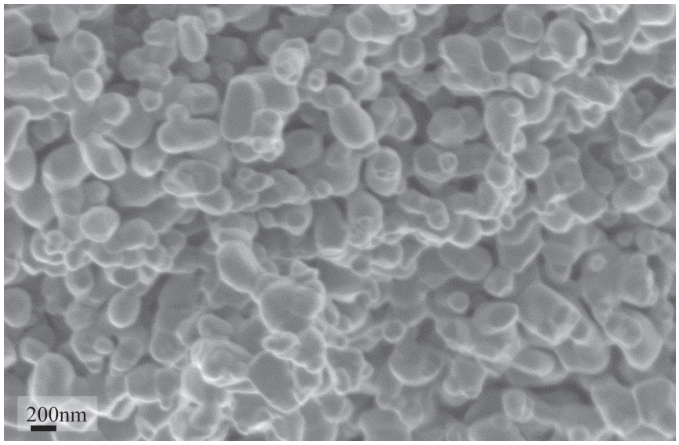

Fig. 1. Calcium phosphate powder after heat treatment at 900°C

Different calcium orthophosphates can be obtained by precipitation by using a definite precursor pair in the form of water solutions of calcium salt and a salt containing the orthophosphate ion, another approach is to vary the conditions of synthesis (temperature and pH). The following calcium orthophosphates are of interest for biomedical applications and can be synthesized by precipitation or hydrolysis: brushite ($CaHPO_4*2H_2O$), monetite ($CaHPO_4$), octacalcium phosphate ($Ca_8(HPO_4)_2(PO_4)_4 *5H_2O$) and hydroxyapatite ($Ca_{10}(PO_4)_6(OH)_2$). Ordinarily, maintaining the pH at a definite level during synthesis guarantees that a powder with a prescribed phase composition will be obtained. Sometimes the pH regulation occurs within the system itself because the precursor pair determines the result of synthesis.

Biphase ceramic containing $Ca_{10}(PO_4)_6(OH)_2$ and β-$Ca_3(PO_4)_2$ has been obtained from a uniform nanocrystalline calcium phosphate powder with the structure of apatite, synthesized from water solutions of calcium apatite and ammonium hydrophosphate with molar ratio Ca/P = 1.5 at room temperature without pH regulation. After firing at 1100°C the material contained 75% β-$Ca_3(PO_4)_2$ and the grain size did not exceed 600 nm. It is suggested that the carbon formed in the interval 200 – 500°C, as a result of the carbonization of the organic components of synthesis adsorbed by particles of powder, be used as a physical barrier impeding intense mass transfer up to 800°C, which makes it possible to obtain an ultrafine grained ceramic with grains smaller than 1 µm.