

07.1-9 GROWTH OF CALCIUM PHOSPHATE CRYSTALS IN GELS AND THEIR CHARACTERIZATION. By W. Kibalczyk, T. Sokołowski and B. Wiktorowska, Institute of Physics, Technical University of Łódź, Łódź, Poland.

There is a considerable uncertainty as to the nature of phases which form in the early stages of the precipitation of calcium phosphates, usually referred to as hydroxyapatite ($\text{Ca}_5(\text{PO}_4)_3\text{OH}$, HAP) (Montel et al., J. Crystal Growth (1981) 53, 74). In this work the possibility of the direct growth of hydroxyapatite in gel medium has been investigated.

Calcium phosphate crystals were grown in silica and tetramethoxysilane (TMS) gels employing double diffusion system with CaCl_2 or $\text{Ca}(\text{NO}_3)_2$ and KH_2PO_4 or K_2HPO_4 aqueous solutions. For the preparation of silica gel pure silicic acid prepared from sodium metasilicate with strongly acid cation exchanger in H form (Karniewicz, Wiktorowska, Kristall u. Technik (1980) 15, 1227) was used. TMS gel was obtained from 2 - 5 % aqueous solution of tetramethoxysilane. Growth was carried out at 37°C for 6 - 16 weeks. After 10 days of growth spherical agglomerates of crystals with diameter less than 1 mm, and after 12 days dendrites of brushite appeared.

The crystals were taken out from the gel and then washed and dried at room temperature. The ball-like agglomerates were examined by SEM, X-ray powder diffraction and electron probe microanalysis. These agglomerates were composed of a large number of platelets and needle-like crystals which were arranged radially thus producing empty spheres with diameters 0.5 - 1.2 mm. The typical size of the platelet crystals and the thickness of the needle were $1 \times 10 \times 100 \mu\text{m}^3$ and $0.8 \mu\text{m}$, respectively.

Electron probe microanalysis showed the Ca/P ratio to be 1.61 - 1.62, without the presence of sodium and silicon in the crystals. X-ray powder diffraction patterns were very similar to those of HAP crystals, but the diffraction patterns also showed a characteristic peak at 18.68 Å for $\text{Ca}_8\text{H}_2(\text{PO}_4)_6 \cdot 5\text{H}_2\text{O}$ (OCP) (Nancollas and Tomažić, J. Crystal Growth (1974) 78, 2218). The structural similarity between HAP and apatitic layer of OCP causes difficulties in distinguishing these two phase. However, the Ca/P ratio indicates that the crystalline material is mainly HAP. The presence of a characteristic diffraction line at 18.68 Å shows that OCP (or calcium phosphate with the nature of sesquapatite) also exists in the crystal agglomerates.

07.1-10 CRYSTALLIZATION PROCESSES IN ORGANIC SYSTEMS OF EUTECTIC TYPE.

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Influence of various solvents on molecular roughness of the solid-liquid interface is investigated. The degree of molecular roughness of the solid-liquid interface can be increased or decreased by selection of the solvent (Podolinsky and Drykin, J. Crystal Growth (1983) 62, 532). As a result faceted to non-faceted or non-faceted to faceted transitions can occur by increasing the concentration of the solvent (table).

Formation of regular and irregular structures is investigated. The relationship between the changes of the faceting parameters α of both eutectic phases and eutectic structure is considered (Podolinsky and Taran, J. Crystal Growth (1981) 52, 82). The phase of with the α factor is decreased creates an exterior phase around the other phase (interior phase) in the beginning of the eutectic solidification.

Nucleation of eutectic phases is investigated. For most of the systems a non reciprocal nucleation behaviour is observed. The interior phase always causes the nucleation of another phase. For some systems a reciprocal nucleation is observed. There are no systems in which neither phase influences on the nucleation of other phase.

System	Roughening transitions (liquidus temperature decreases)	Nucleating phase	Interior phase	Eutectic structure
Eyrene	---	*	*	R
naphthalene	F → NF	---	---	---
p-dibromobenzene	---	*	*	R
naphthalene	F → NF	---	---	---
Eyrene	---	*	*	R
p-dibromobenzene	---	---	---	---
Biphenyl	---	*	*	R
naphthalene	---	---	---	---
Phenanthrene	NF → F	*	*	R
naphthalene	F → NF	*	---	---
Biphenyl	NF → F	*	*	R
camphor	---	---	---	---
Phenanthrene	NF → F	*	*	R
camphor	---	---	---	---
Biphenyl	NF → F	*	---	I
laurin acid	NF → F	*	---	---
Biphenyl	NF → F	*	---	I
myristin acid	NF → F	*	---	---

F - faceted, NF - non-faceted,

R - regular, I - irregular