





VOLUME 2b

CHEMISTRY AND TECHNOLOGY OF MATERIALS AND NANOMATERIALS

ABSTRACT BOOK
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NANOCRYSTALLINE CALCIUM PHOSPHATES FABRICATED UNDER SOLVO- AND IOTHERMAL CONDITIONS

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Synthesis of novel bioceramic materials based on $\text{Ca}_3(\text{PO}_4)_2$ (TCP) and polyphosphates (usually done via high-temperature and solid-state routes) by non-aqueous techniques is of great importance. Microcrystalline and uniform with respect to particle size powders are essential components of photopolymerisable slurries designed for production of osteoconductive bioceramics by 3D-printing. In some studies [e.g.,1], syntheses of microcrystalline (0.2-1 μm) TCP powders in water-methanol and water-ethylene glycol media are reported.

Within this work, synthesis of calcium phosphates in non-aqueous solvents was done in a wide temperature range, up to 350°C. Constitutive role of solvent viscosity was suggested coming from synthesis yields. Syntheses of the phosphates in solvents with high boiling points as well as in imidazole-type ionic liquids (IL) were carried out for the first time. It was shown that nanoparticles of amorphous calcium phosphate could be precipitated in this way. Acid-base reactions (of compounds with $\text{Ca}/\text{P} > 1.5$ – CaO , CaCO_3 , $\text{Ca}_4\text{P}_2\text{O}_9$ with that one of $\text{Ca}/\text{P} < 1.5$ – $\text{Ca}(\text{H}_2\text{PO}_4)_2$, CaHPO_4 , $\text{Ca}_8(\text{HPO}_4)_2(\text{PO}_4)_4 \cdot 5\text{H}_2\text{O}$) in high-boiling non-viscous aprotic solvents (glycols) were treated as prospective solvothermal synthesis pathway. Beneficial potential of specially elaborated ionothermal synthesis in nitrite-nitrate alkaline melts was also mentioned.

References

1. Tao J., Jiang W., Zhai H. et al. *Crystal Growth and Design*, 2008, **8(7)**, 2227.

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