





## VOLUME 2b

# CHEMISTRY AND TECHNOLOGY OF MATERIALS AND NANOMATERIALS

**ABSTRACT BOOK**  
in 5 volumes

26–30 September  
EKATERINBURG • 2016



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**XX Mendeleev Congress on general and applied chemistry.**

Five-volumes book. Vol. 2b : abstracts. – Ekaterinburg : Ural Branch of the Russian  
Academy of Sciences, 2016. – 448 p.

ISBN 978-5-7691-2451-8

Vol. 2b. Chemistry and technology of materials and nanomaterials

Volume 2b includes poster and correspondent presentations of the section: «Chemistry and technology  
of materials and nanomaterials».

**The XX Mendeleev Congress is held under the auspices of  
the International Union of Pure and Applied Chemistry (IUPAC)**

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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  $\mu\text{m}$ ) 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  $\text{Ca/P} > 1.5$  –  $\text{CaO}$ ,  $\text{CaCO}_3$ ,  $\text{Ca}_4\text{P}_2\text{O}_9$  with that one of  $\text{Ca/P} < 1.5$  –  $\text{Ca}(\text{H}_2\text{PO}_4)_2$ ,  $\text{CaHPO}_4$ ,  $\text{Ca}_8(\text{HPO}_4)_2(\text{PO}_4)_4 \cdot 5\text{H}_2\text{O}$ ) 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.

The work was supported by RFBR, grants 15-03-09387, 15-08-99597, 15-38-70047.