

## Nanochemistry and biotechnology

### Crystallization of calcium oxalate monohydrate at different concentrations of the oxalate ion

**Y.V. Taranets, I.M. Pritula, O.N. Bezkravnaya**

*Institute for Single Crystals, NAS of Ukraine. Nauky Ave. 60, Kharkiv-61001, Ukraine.*

*E-mail: j.v.taranets@gmail.com*

Crystallization of biological environments is one of the important areas of research in the field of crystal growth from solutions. Modeling of the behavior of the biological system at changing its parameters (temperature, pH, ionic strength) is especially important in the study of the processes caused by abnormal functions of the body. One of the results of such processes is neoplasms pathogenic nature, in particular people's kidney stones. That stones consist of 80 % calcium oxalate monohydrate ( $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ , COM) [1].

The aim of the study was studying features of COM crystallization depending on the concentration of the oxalate ion in model solutions (0.3-3 mmol) by scanning electron microscopy method. COM crystals were obtained from solutions with the calcium chloride and potassium oxalate of stoichiometric composition. Crystallization was carried in acetate buffer solution (pH=5.8) at 37 °C in conditions close to physiological [2]. The structure and composition of the obtained precipitation was analyzed by X-ray and IR-spectroscopy methods.

It was found that increasing the concentration of the oxalate ion does not affect the phase composition of precipitation. X-ray and IR-spectroscopy investigation show that all precipitations are COM. However, we have observed a change in the habitus of the crystals: the COM single crystals having the form of hexagonal plates were formed with concentration of the 0.3-0.5 mmol oxalate ion; with 1-2 mmol – in addition to single crystals were formed contact and penetration twins. The dendritic crystals COM were formed with the concentrations oxalate ion above 3 mmol. This fact is probably due to the different rate of nucleation which increases with rising concentration of the oxalate ion in solution.

1. *Prein E.* The riddle of Randall's plagues // *J. Urology*-1975.-**114**.-P. 504-507.

2. *Kavanagh J.P., Jones L., Rao P.N.* Calcium oxalate crystallization kinetics at different concentrations of human and artificial urine, with constant calcium to oxalate // *Urol. Res.*-1999.-**27**.-P. 231-237.