



HRVATSKI SKUP KEMIČARA I KEMIJSKIH INŽENJERA

s međunarodnim sudjelovanjem | 4. simpozij "Vladimir Prelog"

9. – 12. travnja 2019. • Šibenik, Amadria Park (Solaris)

CROATIAN MEETING OF CHEMISTS AND CHEMICAL ENGINEERS

with international participation | 4<sup>th</sup> Symposium "Vladimir Prelog"

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# Knjiga sažetaka

## *Book of Abstracts*

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Marulićev trg 19,  
HR-10 000, Zagreb,  
Hrvatska  
Tel.: 01/4597-223  
e-pošta: [hskiki@fkit.hr](mailto:hskiki@fkit.hr)  
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**Investigating the morphological properties of calcium oxalate monohydrate:  
crystal formation in systems with different chemical complexity**  
**Istraživanje morfoloških karakteristika kalcijeva oksalata monohidrata:  
formiranje kristala u sustavima različite kemijske kompleksnosti**

Anamarija Stanković,<sup>1</sup> Silvija Šafranko,<sup>2</sup> Jasminka Kontrec,<sup>3</sup> Branka Njegić Džakula,<sup>3</sup> Daniel Mark Lyons,<sup>3</sup> Berislav Marković,<sup>1</sup> Damir Kralj<sup>3</sup>

<sup>1</sup>Department of Chemistry, J. J. Strossmayer University of Osijek, Croatia

<sup>2</sup>Faculty of Food Technology Osijek, J. J. Strossmayer University of Osijek, Croatia

<sup>3</sup>Ruđer Bošković Institute, Zagreb, Croatia

E-mail: [astankovic@kemija.unios.hr](mailto:astankovic@kemija.unios.hr)

Urolithiasis, the formation of urinary stones in different parts of kidney or bladder, is a specific form of pathological biomineralization [1]. Recently, an increasing prevalence of kidney stones in industrial countries is observed and the interest of scientists to explain their pathogenesis with a special focus on calcium oxalate stones is renewed.

Calcium oxalates crystallize in the form of hydrated salts: thermodynamically stable calcium oxalate monohydrate [2,3] (COM,  $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ ), metastable dihydrate [4,5] (COD,  $\text{CaC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ ) and trihydrate [6,7] (COT,  $\text{CaC}_2\text{O}_4 \cdot 3\text{H}_2\text{O}$ ).

The kidney stones formation under biological conditions can be triggered by various metabolic disorders such as: hypercalciuria, hypocitraturia, hyperoxaluria and the change in the urine acidity. The mechanisms and the conditions under which they crystallize are still not completely clarified [1].

In this work, the spontaneous precipitation and characterization of calcium oxalate monohydrate under conditions of hyperoxaluria ( $c_i(\text{Ca}^{2+}) = 7.5 \cdot 10^{-3} \text{ mol dm}^{-3}$  and  $c_i(\text{C}_2\text{O}_4^{2-}) = 6.0 \cdot 10^{-3} \text{ mol dm}^{-3}$ ) is reported. The experiments were conducted in a model system ( $I_c = 0.3 \text{ mol dm}^{-3}$  NaCl, which imitates the physiological conditions in the human body) at two initial pH ( $\text{pH}_i = 5.0$  and  $9.0$ ) and with the addition of amino acids reportedly important for pathologic biomineralization [8,9]. The amino acids selected for the addition are often found in the urine of healthy people and in the organic matrix which is an integral part of kidney stones. The reactant solutions were mixed under controlled hydrodynamic and thermodynamic conditions. Changes in the structure and morphology of precipitated calcium oxalate monohydrate were observed by means of PXRD, SEM, IR and TGA.

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