



2nd Young Scientists Days - Conference

BOOK OF ABSTRACTS

23rd - 24th May 2019

Department of Biology Osijek
Department of Chemistry Osijek



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**If you truly love nature,
you will find beauty everywhere.**

- Vincent Van Gogh



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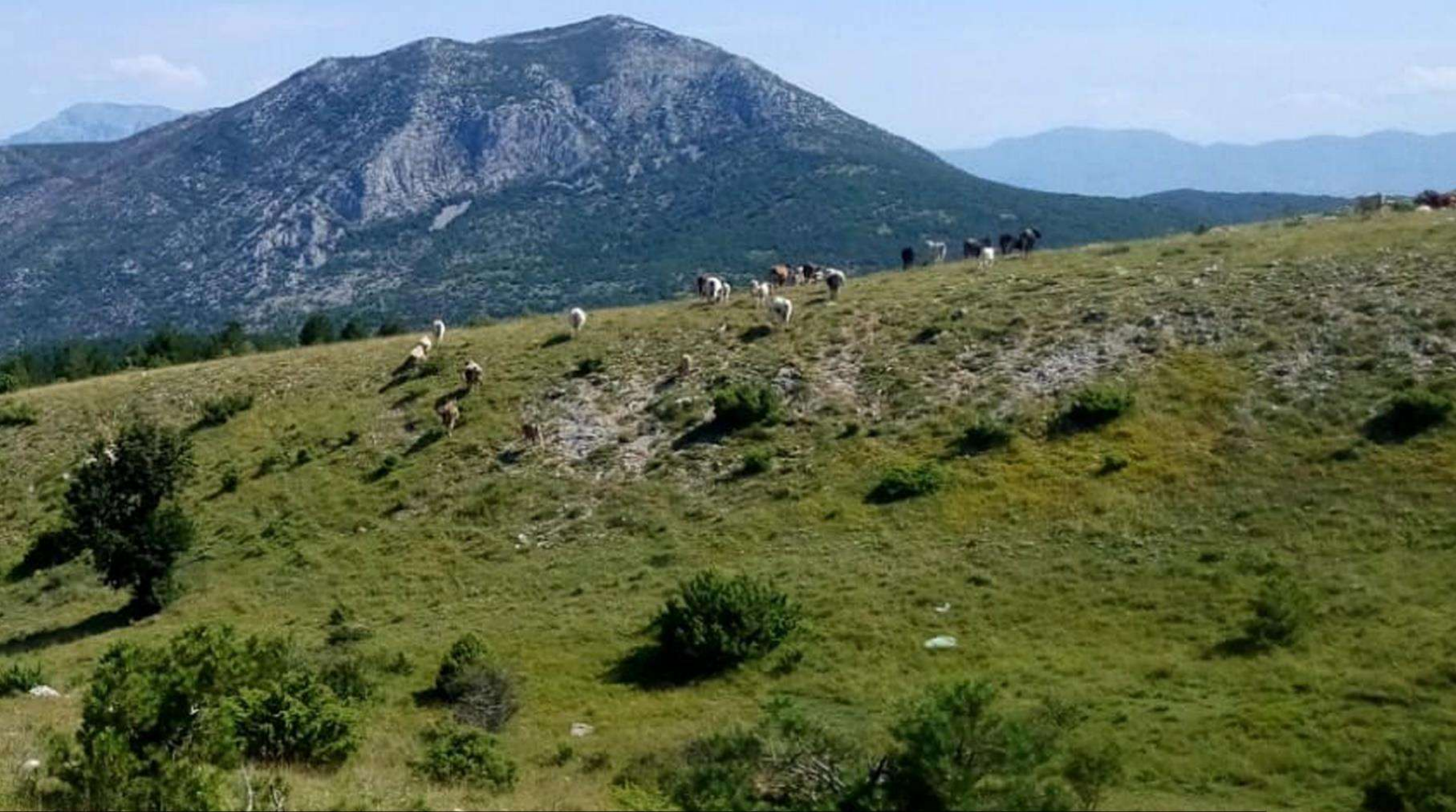


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**The best view comes after
the hardest climb.**

- Anonymous

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An Aqueous Sol-Gel Synthesis of Double and Triple Perovskites with an $A_2Ni(Te/W)O_6$ and $A_3Co_2TeO_9$ Structure Type

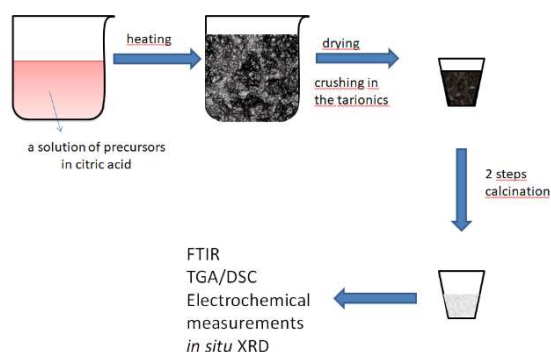
Vodena sinteza sol-gel dvostrukih i trostrukih perovskita tipa $A_2Ni(Te/W)O_6$ i $A_3Co_2TeO_9$

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Abstract: Perovskites are the compounds with a general formula ABO_3 (A = larger cation, B = smaller cation, O = oxygen). The ideal perovskites crystallize in a cubic crystal system that can be predicted by the Goldschmidt tolerance factor formula. Their usage in modern life is widespread, mostly in the digital world, where the emphasis is on the size reduction of the electronic devices and on an expanding density of data storage. The sol-gel chemistry describes a transformation of a liquid precursor into a sol and finally into a gel. These methods are very sensitive because different structures may be obtained using the same precursors, with small modifications in the

reaction conditions. This study presents a citrate sol-gel route of complex metal oxides with a perovskite crystal structure type previously reported in similar compounds. The dried samples were calcined in two steps, at 600 °C and 950 or 1000 °C. The synthesized samples were investigated by the powder X-Ray diffraction to determine a phase composition, FT-IR spectroscopy to determine the presence of organic impurities, and by a thermogravimetric analysis coupled with a differential scanning calorimetry (TGA/DSC) to analyze a thermal stability of the compound and possible phase transitions. The electrochemical measurements were conducted in order to determine an oxidation state of transition metals in the reaction mixture and to determine the reaction mechanism. The *in-situ* X-ray diffraction measurements were conducted up to 900 °C to identify the structural changes during calcination. The results revealed the successfully synthesized tellurium-based metal oxides with a double ($A_2Ni(Te/W)O_6$, A = Sr, Ba) and triple ($A_3Co_2TeO_9$, A = Sr, Ba) perovskite structure type.

This research is a part of the Croatian Science Foundation project entitled *Investigation of Complex Multiferroic Materials Prepared by the Solution Chemistry Methods* under the supervision of Prof. Igor Đerđ, Ph.D.

Keywords: perovskites, sol-gel methods, citrate route

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**The earth has music for those
who listen.**

- George Santayana



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