

HRVATSKO MIKROSKOPIJSKO DRUŠTVO

POZIV NA MJESEČNI SASTANAK

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u organizaciji Vide Strasser

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D n e v n i r e d:

- 1. Sara Marijan:** Structural and electrical studies of sodium vanadium niobium phosphate glasses and glass-ceramics
- 2. Mirela Uzelac:** A new approach to teaching about invasive species using a pocket paper Foldscope microscope
- 3. Razno: pozivi za održavanje pozvanih predavanja, prijavu na stipendije EMC-a i HMD-a, informacije o aktivnostima Društva**

Tajnica:
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Predsjednica:
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Structural and electrical studies of sodium vanadium niobium phosphate glasses and glass-ceramics

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Sodium phosphate-based glasses have been proposed as safer, cheaper, and environmentally friendly materials for electrolytes and/or electrode materials in solid-state battery development. Despite their advantages, these glasses usually suffer from relatively low ionic conductivity. Hence, to improve the electrical conductivity of these materials, new research seeks to clarify the relationship between composition, structure, and electrical properties. Numerous studies showed that significant improvement in electrical conductivity can be achieved when one glass-forming oxide is replaced by another that causes non-linear variation of conductivity, a phenomenon known as the *mixed glass former effect* (MGFE). In addition, crystallization of the glasses, brought about either by controlled heat-treatment or by spontaneous crystallization at the border of the glass-forming composition region, has been recognized as another approach to improve overall electrical conductivity, since it leads to glass-ceramic materials with substantially improved electrical features. In the present work, two series of glasses are prepared by conventional melt-quenching technique from the quaternary system $\text{Na}_2\text{O}-\text{V}_2\text{O}_5-\text{P}_2\text{O}_5-\text{Nb}_2\text{O}_5$. The content of V_2O_5 is kept constant, while P_2O_5 is gradually replaced by Nb_2O_5 , in order to investigate the compositional dependence of the glass-forming tendency and to verify the MGFE in the presence of two conditional glass-formers, V_2O_5 and Nb_2O_5 . The PXRD technique is used to confirm the amorphous character of the prepared glasses, as well as to qualitatively and quantitatively study partially crystallized samples formed by spontaneous crystallization during cooling of high content Nb_2O_5 glass melts. The thermal behaviour of the obtained glass(-ceramics) is analyzed by DTA, while their (micro)structural properties are evaluated by SEM-EDS analysis and IR-ATR spectroscopy. On the other hand, their electrical properties are investigated by solid-state impedance spectroscopy (SS-IS) in a wide range of frequencies (0.01 Hz – 1 MHz) and at different temperatures ($-90\text{ }^\circ\text{C}$ – $240\text{ }^\circ\text{C}$). The relationship between the structural changes that occur upon the exchange of glass-formers along with certain physico-chemical properties of obtained glass(-ceramics) is discussed in detail.

Keywords: glass, glass-ceramic, structural properties, electrical properties

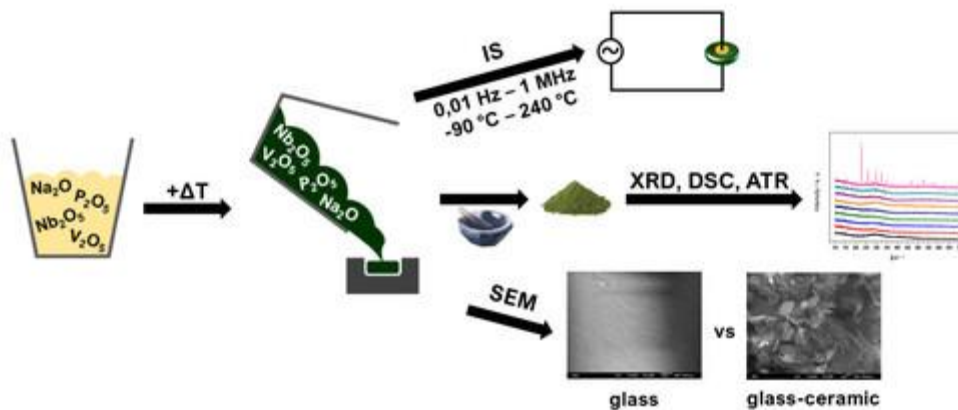


Figure 1. A schematic representation of the study of the quaternary system $\text{Na}_2\text{O}-\text{V}_2\text{O}_5-\text{P}_2\text{O}_5-\text{Nb}_2\text{O}_5$.

References:

1. M. Storek et al., J. Phys. Chem. B 120 (2016) 4482–4495.
2. T.K. Pietrzak et al., Nanomaterials 11 (2021) 1321–1345.

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A new approach to teaching about invasive species using a pocket paper Foldscope microscope

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The world of microscopy is constantly evolving, and in just a few decades, microscopes have become a window into almost everything we can imagine. Just like microscopy, invasive alien plant species (IAPS) have become our everyday topic to deal with. Education is one of the primary measures in response to the problem of the spread of invasive species. The invention of the Foldscope paper microscope in 2014 has made micro-world education more accessible. Foldscope combines low-cost materials with precision optics. With a magnification of 140 x, Foldscope can visualize microorganisms as well as larger samples such as tissues, organs, insects or plants. It is portable, waterproof and can be attached to mobile phones and is, therefore, an excellent educational tool. Here we will present a new approach to the education on IAPS through microscopy, developed in the framework of the Croatian Science Foundation project NATURALLY (IP-2020-02-6899) and intended for the young student population (10-14 years old). The targeted microscopy workshops were held in the outdoor classroom at the Institute of Agriculture and Tourism in Poreč (Croatia). The workshops were designed for upper-grade elementary school students. The first step of the workshop was an introduction to microscopy and invasive species, followed by assembling the paper microscope and preparation of microscopy sections. Leaf and flower tissue preparations of four invasive alien plants (*Ailanthus altissima* (Mill.) Swingle, *Solidago canadensis* L., *Helianthus tuberosus* L. and *Robinia pseudoacacia* L.) were made. Every sample was examined under different magnifications and photographed. The obtained images were sent to Foldscope Microcosmos – an online community platform. In general, this approach has proven successful in raising student motivation to learn and apply microscopic methods in exploring the environment and encouraging discussion on ecological topics.

Keywords: education, microscopy, invasive alien plants, science popularization

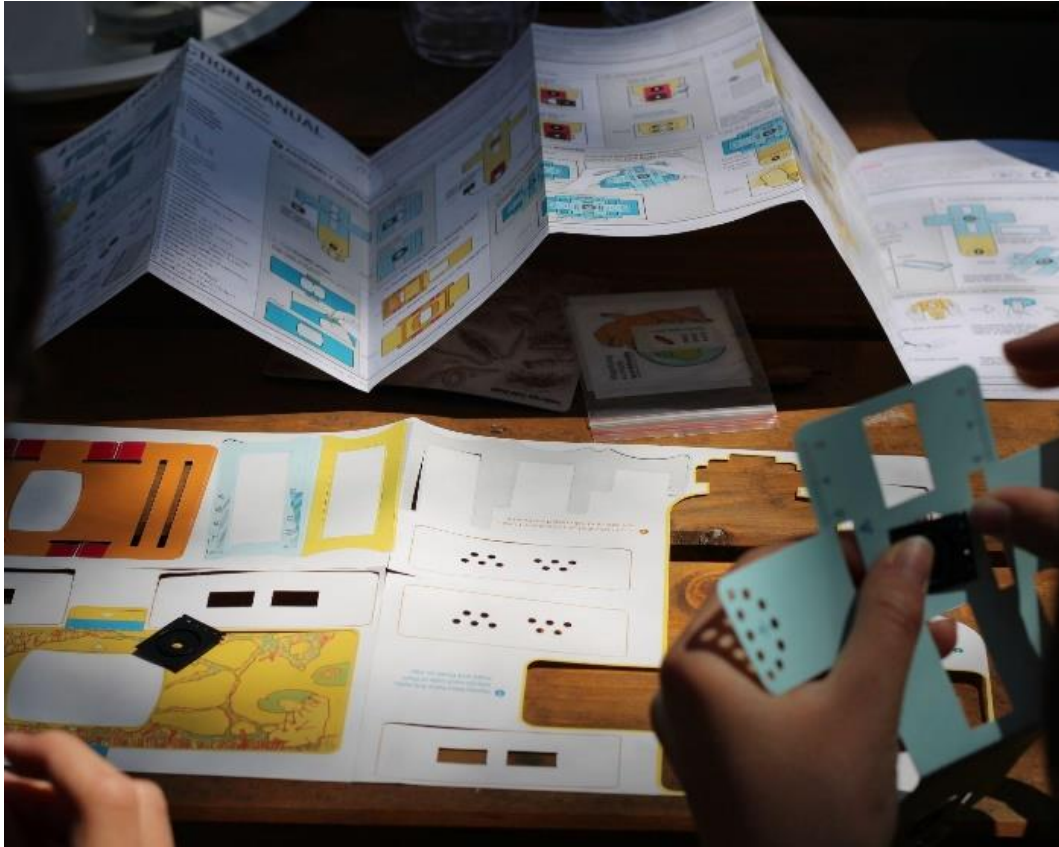


Figure 1. The process of assembling the Foldscope paper microscope.

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