PRESENTER INFORMATION

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BIOGRAPHICAL SKETCH

Dr. Pisk studied at the Department of Physics, Faculty of Science, University of Zagreb. She received her Ph.D. Degree in Chemistry, in 2012. She is an Assistant Professor since 2018, at the Department of Chemistry, Faculty of Science, University of Zagreb. In 2010, she was a member of prof. Poli group in Toulouse, France, for 9 months, and in 2015 she got a Postdoctoral fellowship for the project "Diligent search for chemical bio-sources: Solvent-free homogeneous and heterogeneous oxidation processes catalyzed by polyoxometalates (PomFree)", Newfelpro and Marie Curie Cofound, in the same group. Her research interest is molybdenum coordination complexes and their catalytic activity in the oxidation processes and recently catalytic activity of glass and glass-ceramic based on transition metal oxides. J. Pisk published 32 publications so far.

TITLE: APPLICATION OF POROUS AND NONPOROUS MATERIALS BASED ON TRANSITION METAL OXIDES IN OXIDATION REACTIONS

ABSTRACT: Transition metal (TM) catalysts, based on molybdenum, vanadium, and tungsten, are known to be active and selective in oxidation processes. The starting research involved molecular catalysts (mononuclear and polynuclear coordination complexes and various supramolecular structures) to the supported ones (polyoxometalates attached to the Merrifield supports). All catalysts were tested in (ep)oxidation reactions following green chemistry principles. The emphasis is on minimal catalyst loading, no organic solvents added to the reaction mixture, and the utilization of oxidants available in the water solution. Further research interest is the preparation of materials containing copper metal centers and amino acid ligands, due to their versatile biological properties. The obtained materials were further tested both as conductors and catalysts. So far, the results have shown an interesting correlation between structure – conducting – catalytic properties. Recently, a new point of investigation has been opened: the preparation of oxide glasses and glass- ceramics. In the context of electrical/dielectric properties of glasses, there are still phenomena that have not been entirely resolved and are of great fundamental as well as technological importance. Glasses containing mobile alkali ions and transition metal oxides (TMO) such as WO_3, Nb_2O_5, Fe_2O_3, V_2O_5, and MoO_3 are of significant prominence with mixed-ion polaron conductivity [1-

9]. This transport is not simple as it involves mutual interactions between ions and polarons in these glasses: Nevertheless, it is especially attractive for applications as electrode materials for batteries, memory switching, and electrical threshold devices. The second phenomenon, the mixed glass-network former effect (MGFE), occurs in systems containing mobile alkali ions and two glass-network former oxides, namely traditional (SiO_2, P_2O_5, GeO_2, V_2O_5) and/or conditional one (WO_3, Nb_2O_5, Fe_2O_3, MoO_3) [9- 12]. Moreover, spontaneous or additional crystallization via controlled heat-treatments (HT) provides glass-ceramics that improve many glass properties, particularly electrical properties. Both effects highlight the important role of structure for electrical transport in glass-(ceramics). Based on the above-mentioned, the catalytic testing with these materials containing various metal oxides opens new directions in developing and applying the obtained materials. The tested samples (glass and glass ceramics) were prepared by mixing, melting, and quenching Na_2O-V_2O_5-P_2O_5-Nb_2O_5 in different molar ratios. Two different oxidizing agents were used: TBHP in decane and TBHP in water. The obtained catalytic results were correlated to the electric properties.

[1] C. Bazan et al., SolidState Ionics, 86-88, 497-501, (1996). [2] P. Jozwiak et al., SolidState Ionics, 176, 2163-2166 (2005). [3] L. Bih et al., Journal of Molecular Structure, 872, 1-9 (2008). [4] P. E. di Pratula et al., Solid State Sciences, 49, 83-89 (2015). [5] J. Nikolić et al., Journal of the American Ceramic Society, 101, 1221-1235 (2018). [6] L. Pavić et. al., Journal of Non-Crystalline Solids,535, 119969 (2019). [7] S. Kubuki et al., Journal of Non-Crystalline Solids, 570, 1209982021 (2021). [8] A. Ibrahim et al., Journal of Alloys and Compounds, 930, 167366 (2023). [9] S. Renka et al., Physical Chemistry Chemical Physics,23, 9761-9772 (2021). [10] P. Mošner et al., Coatings, 12, 1626 (2022). [11] K. Sklepić et al., The Journal of Physical Chemistry C, 121, 17641-17657 (2017). [12] K. Sklepić, The Journal of Physical Chemistry C, 125, 10593-10604 (2021).