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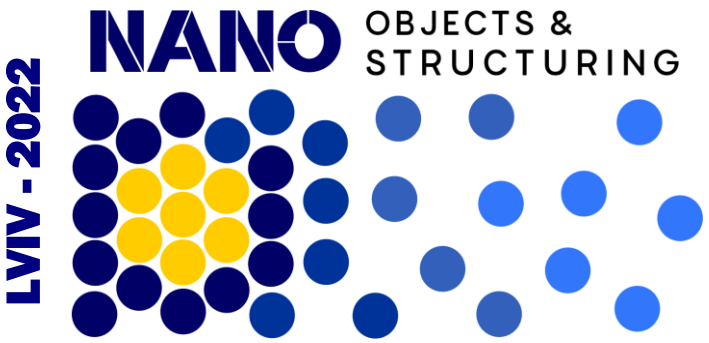

2nd INTERNATIONAL RESEARCH and PRACTICE CONFERENCE «NANOOBJECTS & NANOSTRUCTURING» (N&N–2020)

September 26–28, 2022, Lviv, Ukraine

PROCEEDINGS

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2nd International Research and Practice Conference «Nanoobjects & Nanostructuring» (N&N–2022) was held at Ivan Franko National University of Lviv on September 26–28, 2022. This Proceedings contains the results of studies, curried out in the Ukrainian universities and research Institutes of the National Academy of Sciences of Ukraine, and also scientific centres of Poland, Slovak Republic, USA, Finland and Hungary in the following fields: physical chemistry of nanosized and nanostructured materials; nanostructuring in 0D–3D systems: thermodynamic and kinetics aspects; synthesis and characterisation of nano-objects; organic and inorganic nanomaterials, supramolecular chemistry; application of nanostructurized systems.

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NANOFABRICATION OF HYBRID COMPOSITES WITH DIELECTRIC AND SEMICONDUCTOR MATRICES

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Improving the performance of organic electronic devices is possible due to the development of hybrid nanocomposites of conducting polymers with dielectric matrices or inorganic semiconductors. These composites may be fabricated by simple, safe and energy saved methods without vacuum technologies. Conducting polymers can be considered as "synthetic nanometals" with a particle diameter of 10-20 nm and unique electronic, optical, electrochemical, and catalytic properties, the ability to absorb radioactive rays [1]. Semiconductor materials with spatially inhomogeneous structures – layered, porous, dispersive – attract special attention due to the possibility of a new type of hybrid materials formation.

The structure, electrical and optical properties of hybrid nanocomposites based on dielectric polymer or semiconductor (porous silicon, gallium, or indium selenide) matrices with conducting polymers – poly(o-toluidine), poly(o-anisidine), polyaniline, and poly(3,4-ethylenedioxythiophene) have been studied. It is shown that the concentration dependence of the specific conductivity of composites on the content of conducting polymer has a percolation character with a low "percolation threshold", which depends on the nature of the polymer matrix and is in the range of 1,7–2,5 vol.%. The calculated critical parameters of percolation 1,54–1,88 are characteristic of the formation of an infinite 3-dimensional cluster of conductivity. The conductive filler forms its own polymer network inside the host dielectric polymer or semiconductor matrix. As shown by EPR-spectroscopy [2] a dielectric polymer matrix causes significant delocalization of the charge along the macrochains.

Semiconductor nanocrystals embedded in the polymer matrix and conducting polymers integrated with porous semiconductor mediums significantly affect the electrical, electrooptical, and luminescent properties of composites causing the shift of spectrum and change of its intensity [3]. The connection between the conditions of synthesis, structure, and properties of materials can cause the functionality of conducting polymer composites for their application in organic electronic devices – gas sensors, organic displays, solar cells, etc.

[1] O. I. Aksimentyeva, I. B. Chepkov, R. V. Filipsonov, S. Z. Malynych, R. V. Gamernyk, G. V. Martyniuk, Yu. Yu. Horbenko. Hybrid composites with low reflection of IR radiation // Phys. Chem. Solid State. – 2020. – 21. – P. 764 – 770.

[2] O. I. Aksimentyeva, et al. Chapters 3-6, 9 and 13 // Computational and Experimental Analysis of Functional Materials. – Toronto: Apple Academic Press, 2017. – 510 p.
[3] I. B. Olenych, L. S. Monastyrskii, O. I. Aksimentyeva. Chapter 22: Photovoltaic structures based on porous silicon // Silicon Nanomaterials Sourcebook. – USA, University of Hawaii at Manoa: CRC Press, 2016. – 27 p.

THE CONTENT OF TUNGSTEN OXIDE IN WO_3-ZrO_2-P NANOCATALYSTS AS A TOOL OF TUNING OF THE SELECTIVITY OF THE GLYCEROL DEHYDRATION PROCESS

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The effect of tungsten oxide content in phosphate-stabilized WO_x-ZrO_2 nanocompositions on their catalytic behavior in gas-phase glycerol dehydration has been studied. It has been established that composition of nanosized phosphate-stabilized tungsten-zirconium oxide catalysts determines the nature of the surface functional groups that are the active sites responsible for the direction of glycerol dehydration. Nanocatalysts with a low WO_x content are characterized by the presence of relatively weak Brønsted acid sites, Zr-OH^+ та W-OH^+, as well as stronger Lewis sites Zr^{4+} and W^{6+}. These catalysts are selective for the formation of acetol, which is the product of soft dehydration of glycerol with the detachment of

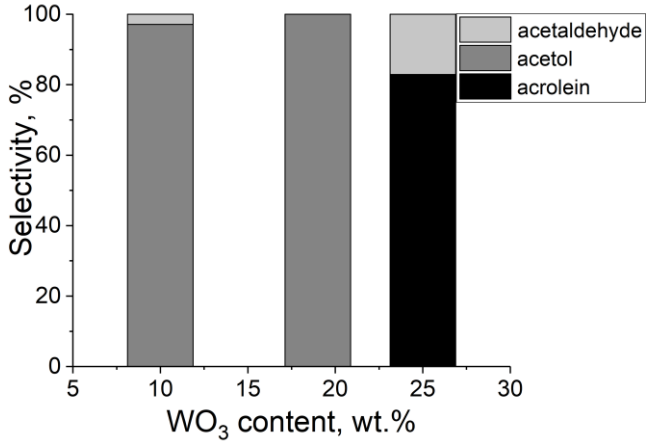

Fig. 1. Products distribution for WO_x–ZrO_2-P catalysts with different WO_3 content.

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