



ABSTRACT BOOK

International research
and practice conference:

**NANOTECHNOLOGY
AND NANOMATERIALS
(NANO-2022)**

25-27 August 2022
Lviv, Ukraine

**INTERNATIONAL RESEARCH
AND PRACTICE CONFERENCE
“NANOTECHNOLOGY
AND NANOMATERIALS”**

(The NANO-2022 Conference is dedicated
to the International Year of Basic Sciences
for Sustainable Development)

25-27 of August 2022

Lviv, UKRAINE

Abstract book

The International research and practice conference “Nanotechnology and nanomaterials” (NANO-2022). Abstract Book of participants of the International research and practice conference, 25–27 August 2022, Lviv. Edited by Dr. Olena Fesenko. – Kyiv: LLC APF POLYGRAPH SERVICE, 2022. – P. 542.

This book contains the abstracts of contributions presented at the International research and practice conference “Nanotechnology and Nanomaterials” (NANO-2022).

The NANO-2022 Conference was organized by the Institute of Physics of NAS of Ukraine with the participation of the University of Tartu (Estonia), the Lviv Polytechnic National University, University of Turin (Italy) and Pierre and Marie Curie University – Paris 6 (France).

NANO-2021 was the ninth conference in the series of NANO-conferences initiated by the Institute of Physics of NAS of Ukraine in 2012 in the framework of FP7 Nanotwinning project. From year to year, they attract more attention and participants. In 2012, the first meeting was held in the format of International Summer School for young scientists «Nanotechnology: from fundamental research to innovations». The 2013 and 2014 conferences were organized in conjunction with the International Summer Schools for young scientists under the same title. In 2013, this event was attended by more than 300 scientists, in 2014-2017, 450 scientists took part and in 2018 it gathered above 650 participants. In 2021 conference was attended by more than 700 scientists from Ukraine, Poland, Italy, Estonia, France, Austria, Germany, Greece, Turkey, USA, Romania, Moldova, Czech Republic, Taiwan, Lithuania, Egypt, Iran, India, Algeria, Indonesia and other countries. In 2021 the Organizer Committee has received more than 800 application forms from about 25 countries of the world.

The NANO-2022 conference brought together leading scientists and young researchers from many countries of the world. This year its topics were as follows: Nanobiotechnology for health-care; Nanochemistry and biotechnology; Nanocomposites and nanomaterials; Nanoobjects microscopy; Nanooptics and photonics; Nanoplasmonics and surface enhanced spectroscopy; Nanoscale physics; Nanostructured surfaces; Physico-chemical nanomaterials science.

Website of the Nano-2022 conference: <http://nano-conference.iop.kiev.ua>

In order to support the formation of the communications between the scientific and innovation communities the EEN-Ukraine consortium together with EEN partners in Germany organized STARTUP2022 competition for selection 10 the best Ukrainian startups for participation in the Start-up BW Summit, Germany.

Genotoxicity of $\text{GdVO}_4\text{:Eu}^{3+}$ nanoparticles *in vitro*: an experimental assessment

Tkachenko A.S.¹, Prokopiuk V.Yu.¹, Onishchenko A.I.¹,
Yefimova S.L.², Maksimchuk P.O.², Klochkov V.K.²

¹Research Institute of Experimental and Clinical Medicine,
Kharkiv National Medical University. Nauki ave, 4, Kharkiv-61018, Ukraine.
E-mail: as.tkachenko@knmu.edu.ua

² Institute for Scintillation Materials, NAS of Ukraine (Ukraine).
Nauki ave, 60, Kharkiv-61072, Ukraine.

Mutagenic properties are a major challenge to the application of drugs in clinical practice. Any potential drug is tested in the preclinical stage for genotoxicity. Novel nanomaterials, which are promising for use in oncology, infectology and implantology, should be tested for their harmfulness to genetic material.

The aim of this study was to evaluate the genotoxicity of gadolinium orthovanadate nanoparticles ($\text{GdVO}_4\text{:Eu}^{3+}$) *in vitro*.

Materials and methods. Genotoxicity studies were performed by the micronucleus assay. The skin fibroblasts of rat fetuses cultivated in DMEM medium with 10% fetal bovine serum in a CO_2 incubator were used after 3 passages. Following transplantation into a 24-well plate at a concentration of 50 000 cells per well, $\text{GdVO}_4\text{:Eu}^{3+}$ nanoparticles were added at concentrations of 0-30-65-130-260-520 $\mu\text{g} / \text{ml}$. The cells incubated for a short period of time with cisplatin were used as a positive control, while the intact cells were used as a negative control. After 72 hours, the cells were fixed with ethanol, stained according to Romanowsky – Giemsa. The number of cells with micronuclei was identified. Statistical data processing was performed by Kraskel-Wallis and Dunn's tests.

Results. In this study, the genotoxic effect of $\text{GdVO}_4\text{:Eu}^{3+}$ nanoparticles was evaluated by the micronucleus assay on the culture of fibroblasts and no damaging effect was revealed when using nanoparticles at concentrations of 30-65-130 $\mu\text{g} / \text{ml}$. The number of cells with micronuclei did not differ from the negative control. At high concentrations, it was technically impossible to perform micronucleus calculations due to loss of cell adhesion and lack of division. In cultures exposed to cisplatin, the number of cells with micronuclei was statistically significantly higher. The cell shape, shape and size of nuclei changed.

Conclusions. $\text{GdVO}_4\text{:Eu}^{3+}$ nanoparticles show no genotoxic effect on fibroblast cultures *in vitro*.