UNAT

Ultra-small Nanohybrides for Advanced Theranostics

Newsletter 6 – February 2025

Consortium

Coordinator

Université Claude Bernard Lyon 1
France

Corporation Science Park Taras Shevchenko University Of Kyiv
Ukraine

Consiglio Nazionale Delle Ricerche
Italy

Bioemission Technology Solutions IKE
Greece

Glincs
France

The project

Nanoscale materials have gained a place in the spotlight as enablers of combination diagnostic-therapeutic technologies due to their tiny penetrating sizes and their unique functional properties.

Nanohybrids that contain both organic and inorganic components, including metallic ones, offer tremendous opportunity for the functionalisation of biological or bioactive molecules.

The EU-funded UNAT project will explore the capabilities of metal-carbon nanohybrids for multimodal in vivo imaging and therapy of tumours via electromagnetic radiation.

The diagnosis and therapy of cancer will be evaluated through an ambitious campaign of preclinical in vitro and in vivo experiments.

Key figures

5 years (2021-2026)
5 partners
4 countries
832 k€

More information on **www.unat-project.eu**

UNAT Implemented secondments

Research and Innovation Staff Exchange (RISE) projects fund short-term exchanges ("secondments") for staff to develop careers combining scientific excellence with exposure to other countries and sectors. RISE enables more interaction between academia and non-academic organisations within Europe and worldwide.
The following secondments were implemented between **August 2024** and **January 2025**:

PYLYPOVA Olha	SCIENCE PARK	UCBL	12/10/2024 – 30/10/2024
TOPCHYLO Anna	SCIENCE PARK	UCBL	07/10/2024 – 07/03/2025
LYSENKO Anastasia	SCIENCE PARK	UCBL	07/10/2024 – 07/03/2025
LYTVYNENKO Sergii	SCIENCE PARK	UCBL	14/01/2025 – 15/03/2025
BORISOVA Tatiana	SCIENCE PARK	UCBL	20/01/2025 – 04/04/2025
GRYN Svitlana	SCIENCE PARK	CNR	10/01/2025 – 10/03/2025

Valeriy SKRYSHEVSKYY (Science Park) awarded the Order of Merit

Prof.**Valeriy Skryshevskyy**, in charge of the UNAT project at Science Park and Head of the Department of Nanophysics of Condensed Matter of the Educational and Scientific Institute of High Technologies of Taras Shevchenko National University of Kyiv, has been awarded the Order of Merit of the III degree. (DECREE OF THE PRESIDENT OF UKRAINE No. 686/2024).

This honor recognizes his significant personal contribution to the development of national education, the training of highly qualified specialists, and his many years of fruitful scientific and pedagogical activity. His significant work on the UNAT project is a prime example of his contributions.

For more details, please visit the official website of the President of Ukraine :
https://www.president.gov.ua/documents/6862024-52377

Article published within the framework of WP2 & WP4 – Science Park

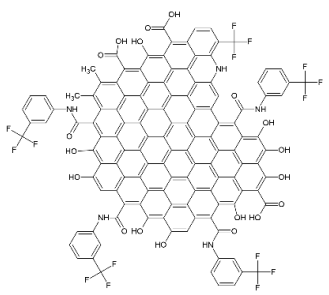
Title : **Size dependent properties of Gd^{3+}-free versus Gd^{3+}-doped carbon dots for bioimaging application**

Authors : Nazym Zhylkybayeva, Konstantin Paliienko, Anna Topchylo, Alexander Zaderko, Alain Géloën, Tatiana Borisova, Liudmyla Grishchenko, Ruslan Mariychuk, Valeriy Skryshevsky, Gauhar Mussabek, Vladimir Lysenko, Size dependent properties of Gd3+-free versus Gd3+-doped carbon dots for bioimaging application, (2024)

Scientific Reports 14 (1), 27812, DOI: 10.1038/s41598-024-76500-z. – Article in Open Access

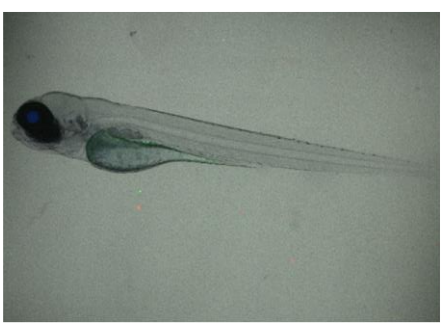
New type of nanohybrids developed in frame of UNAT

Nanoparticle (NP) type

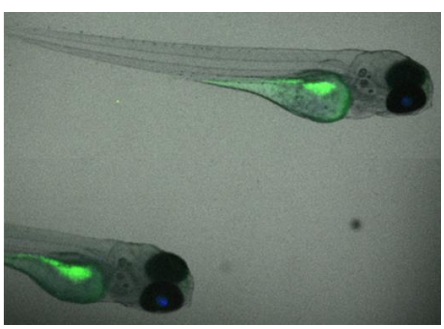


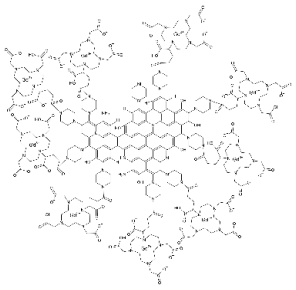
(A)

Zebrafishes without NPs

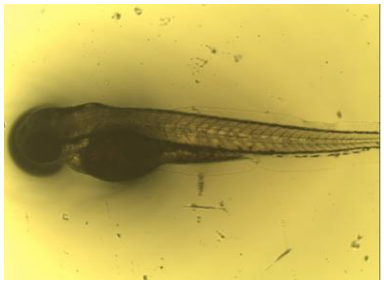


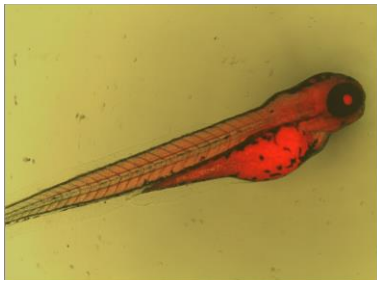
Zebrafishes with NPs





(B)





Fluorinated carbon dots (A) and carbon dots-based nanohybrides (B) were developed by researchers from UCBL (Lyon, France) and Science Park (Kyiv, Ukraine) in frame of the work package 2 “Fabrication of Nanohybrids” of the UNAT project. Perfect biocompatibility of these nanomaterials was stated in frame of the work package 3 “Toxicity of Nanohybrids”. Currently, these carbon-based nanomaterials are studied in frame of the work package 4 “Bioimaging”. In particular, green and red fluorescence imaging of zebrafishes was recently carried out by the UNAT consortium in collaboration with scientists from Jagiellonian University Medical College (Krakow, Poland). Fluorescence analysis of fluorinated carbon dots (A) distribution in zebrafishes revealed intense green fluorescence in the stomach and intestine of all larvae in the test group. Moreover, strong red fluorescence was also observed in the yolk sac and other body parts of the zebrafishes exposed to the carbon dots-based nanohybrides (B). In future, the UNAT consortium will be focused on application of the multi-modal nanohybrides for other bioimaging approaches.

Dr. Svitlana GRYN (Science Park) is currently seconded at the ISSMC - CNR

Dr. Svitlana Gryn from Science Park is spending two months on secondment (10.01.2025–10.03.2025) at the Institute of Science and Technology for Ceramics (ISSMC) of CNR in Faenza. Her visit is proving to be highly productive: she is receiving training on the synthesis of carbon dots (CDs) derived from bio-wastes, such as by-products of the food industry. These CDs are being synthesized using both microwave-assisted and hydrothermal methods. As a result, Gd-doped CDs and CDs with tunable luminescent properties for theranostic applications have been developed. The characterization of these materials is currently underway, and we anticipate promising results that will bring us closer to our goal of creating effective platforms for cancer diagnosis and therapy.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 101008159