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Currently held positions

Institute of Medical Biology of the Polish Academy of Sciences *Łódź*

Full Professor position

Institute of Medical Biology of the Polish Academy of Sciences *Łódź*

Head of Laboratory of Medicinal Chemistry

POL-OPENSCREEN Platform

Coordinator

Scientific profile and collaborations

RESEARCH: Synthesis, studies of the physicochemical and biological properties of modified nucleosides, nucleotides and DNA/RNA oligonucleotides containing boron clusters and their complexes with metals, the relationship between the structure and physicochemical and biological properties of modified DNA/RNA-oligonucleotides and their components, modified nucleic acids as new materials for molecular technologies, biotherapeutics, nanomaterials and molecular probes. Nucleoside derivatives with antiviral, antitumor and purinergic receptor modulating activity. Boron carriers for boron neutron capture therapy of tumors (BNCT).

CONTRIBUTION TO THE MEDICINAL CHEMISTRY OF BORON CLUSTERS: (1) Development methods for boron cluster oligofunctionalization **(2)** Development (not available so far) methods for modification of purine nucleosides with boron clusters **(3)** Synthesis and identification of several nucleoside-boron cluster conjugates with anticancer, antiviral and purinergic receptors modulating activities.

CONTRIBUTION TO NUCLEIC ACID CHEMISTRY: (1) Development of the first method for stereoselective synthesis of P-chiral DNA/RNA- oligonucleotide analogues, based on transesterification reaction **(2)** Development of several general methods for modification of DNA/RNA-oligomers and their nucleoside components with boron clusters, including “click chemistry” (“chemical ligation”) methodology **(3)** Development of new class of redox labels for electrochemical DNA detection based on boron clusters and their complexes with metals (metallacarboranes) **(4)** Development of new type of bionanomaterial based on composites of DNA and boron clusters and their use as carriers of therapeutic nucleic acids.

Selected publications

2024 ***Composites of DNA and boron cluster and their assembly into functional nanoparticles with dual antisense anti-EGFR and c-MYC oncogenes activity*** **[link]**

2021 ***Carborane- or Metallacarborane-Linked Nucleotides for Redox Labelling. Orthogonal Multipotential Coding of all Four DNA Bases for Electrochemical Analysis and Sequencing*** **[link]**

2016 ***Challenges and Opportunities for the Application of Boron Clusters in Drug Design*** **[link]**

Research grants

Principal Investigator: 10 grants: KBN, NCN, MNiSW

Project Manager: 3 grants: The European Commission’s HORIZON 2020; European Infrastructure of Open Screening Platforms for Chemical Biology (EU-OPENSCREEN)

Co-Investigator: 6 grants: KBN, NCN, MNiSW, Department of Energy USA, DE-FG02-96ER62156

Obtained patents

8 patents given by Polish Patent Office and 2 US patents

International research stays

USA: University of Virginia, Charlottesville, VA, USA; Emory University and the Veterans Affairs Medical Center, Atlanta, GA, USA; Thomas Jefferson University, Philadelphia, PA, USA

Germany: European Laboratory of Molecular Biology, Haidelberg and Max Planck Institute, Göttingen

Japan: Tohoku University, Sendai

and others