



Division of Biophysics
Institute of Experimental Physics
Faculty of Physics
University of Warsaw
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Poland



Joanna Kowalska asia@biogeo.uw.edu.pl

Education

- 2010** **Ph.D., Biophysics**, University of Warsaw, Faculty of Physics (with distinction)
• *Synthesis and properties of mRNA cap analogs modified in the phosphate chain and their applications in studying mechanisms of mRNA degradation and translation* -supervised by Prof. Edward Darzynkiewicz and Dr Jacek Jemielity
- 2006-2010** Ph.D. Studies at the Faculty of Physics, University of Warsaw
- 2006**
- 2005** **M.Sc., Organic Chemistry**, Faculty of Chemistry (with distinction)
• *Synthesis and properties of 5' mRNA cap analogues containing phosphorothioate moiety*; supervised by Dr Jacek Jemielity
- 2002-2006** **B.Sc., Biotechnology**, University of Warsaw, Faculty of Biology (with distinction)
• *The role of RRM domains in RNA-protein interactions*; supervised by Dr Agnieszka Dzikowska
- Studies at the College of Inter-Faculty Individual Studies in Mathematics and Natural Sciences (MISMaP) including studies at the Faculty of Chemistry (2002-2006) and studies at the Faculty of Biology (2002-2005)

Employment

Ix.2010–I.2011 Faculty of Physics University of Warsaw, research-teaching assistant

II.2011–present Faculty of Physics University of Warsaw, assistant professor

Research Interests

- Chemical synthesis and properties of biologically important nucleotides and their analogues.
- Design and synthesis of mRNA 5' end (cap) analogs as reagents for preparation of mRNAs with applications in biotechnology and medicine.
- Design and synthesis of cap analogs as highly potent inhibitors of cap-dependent translation.
- Delivery of nucleotides into cells.

Selected Publications

Co-author 33 scientific papers and 4 patent applications (two U.S. patents granted and several in other countries).
More publications can be found in G. Scholar profile <http://scholar.google.pl/citations?user=zfCwzDwAAAAJ&hl=pl&oi=ao>) or Web of Science (Researcher ID J-4536-2014)

- Synthesis, properties, and biological activity of boranophosphate analogs of the mRNA cap: versatile tools for

manipulation of therapeutically relevant cap-dependent processes, Kowalska, J. et al., *Nucl. Acids Res.* (2014) 42 (16): 10245-10264. doi: 10.1093/nar/gk

- Virus-like particle-mediated intracellular delivery of mRNA cap analog with *in vivo* activity against hepatocellular carcinoma, Zochowska, M. et al. *Nanomedicine: Nanotechnology, Biology and Medicine* (2014) in press
- Preparation of Synthetically Challenging Nucleotides Using Cyanoethyl P-Imidazolides and Microwaves, Strenkowska, M. et al., *Org. Lett.* (2012)
- Synthesis of nucleoside phosphosulfates Kowalska, J. et al., *Bioorg. Med. Chem. Lett.* (2012) Synthesis and characterization of mRNA cap analogs containing phosphorothioate substitutions that bind tightly to eIF4E and are resistant to the decapping pyrophosphatase DcpS, Kowalska, J. et al., *RNA* (2008), 14(6): 1119-1131
- Phosphoroselenoate Dinucleotides for Modification of mRNA 5' End Kowalska J. et al. *ChemBioChem* (2009) 10, 2469-2473
- Phosphorothioate cap analogs increase stability and translational efficiency of RNA vaccines in immature dendritic cells and induce superior immune responses *in vivo*, Kuhn, A.N. et al. *Gene Ther.* (2010) 17, 961-971

Ongoing Research Support

Most important research projects from last 4 years:

LIDER/000/14003/L-5/12/NCBR/2013 PI: Kowalska
2014-2017

Grant from National Centre of Science and Development

New high throughput methods for screening for inhibitors of therapeutically relevant pyrophosphatases based on fluorophosphate analogs of nucleotides.

Role: PI

UMO-2011/01/D/ST5/05869 PI: Kowalska
2011-2016

Grant from Polish National Science Center

Conjugates of analogs of mRNA 5' end with nanomaterials and biomolecules of a potential application in pharmacology or diagnostics.

Role: PI

NCN UMO/2012/05/E/ST5/03893 PI: Jemielity
2013-2018

Grant from Polish National Science Center

New reagents and methods in synthesis of modified nucleotides and their application for preparation biochemical tools and nucleotides with great therapeutic potential

Role: Co-investigator

Research Experience

August 2012 two-week training in prof. Roger Stromberg Group at the Karolinska Institutet, Stockholm Sweden – synthesis of linkers for nucleic acids bioconjugation and chemoenzymatic synthesis of protected nucleosides

August-September 2013 two months training in prof. John D. Gross group at University of California, San Francisco, United States - studying ligand protein-interactions using STD NMR

Teaching Experience

Lecturer:

- Organic Chemistry (1st year lecture and class for B.Sc. students of Application of Physics in Biology and Medicine)
- Interpretation of spectra of organic compounds (2nd year lecture and class for M.Sc. students of Application of Physics in Biology and Medicine)

Teaching Assistant:

- Practicum in Chemistry (*1st year lab for B.Sc. students of Application of Physics in Biology and Medicine*)
- Laboratory of Chemistry (*2nd year lab for B.Sc. students of Application of Physics in Biology and Medicine*)
- Advanced Biophysics Lab (*3rd year lab for B.Sc. students of Application of Physics in Biology and Medicine*)
- Bioorganic Chemistry (*1st year class for B.Sc. students of Application of Physics in Biology and Medicine*)

Distinctions and Awards

- IS₃NA A. Holy IRT Poster Award at the "21st International Round Table on Nucleosides, Nucleotides and Nucleic Acids, Chemical Biology of Nucleic Acids", Poznań, Poland (2014)
- University of Warsaw Rector's Second Degree Award (2014)
- Prof. Stefan Pienkowski Award for scientific achievements (2013)
- "Modern University" fellowship for young scientists awarded by the University of Warsaw (2012)
- Ministry of Science and Higher Education fellowship for young scientists (2011-2014)
- First Prize in the 3rd edition of Innovator of Mazovia Competition (2011)
- Best Poster Presentation Award on the 53th Annual Meeting of the Polish Chemical Society (PTChem) and the Association of Engineers and Technicians of Chemical Industry (SiTPChem), Gliwice, September 2010
- START Fellowship for Young Scientists of the Foundation for Polish Science (2008 and 2009)
- L'Oreal for Women in Science Fellowship (Polish Edition, 2009)
- Rector Grzegorz Białkowski Award from Faculty of Physics, University of Warsaw (shared with dr Joanna Żuberek and dr Jacek Jemielity) for "Design and chemical synthesis of mRNA cap analogues and biophysical studies of their interaction with protein factors" – (2008)
- "Travel Award" at the Joint Symposium of the 18th International Roundtable on Nucleosides, Nucleotides and Nucleic Acids and the 35th Symposium on Nucleic Acids Chemistry, Kyoto, Japan (2008)
- Scholarship of Polish Ministry of Science and Higher Education 2004-2005 and 2005-2006
- Best Poster Presentation Award on XIII Symposium on The Chemistry of Nucleic Acid Components, Spindleruv Mlyn, Czech Republic (2005)