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Education

2012 **Habilitation, Bioorganic Chemistry**, University of Warsaw, Faculty of Chemistry
2002 **Ph.D., Chemistry**, University of Warsaw, Faculty of Chemistry
1998 **M.Sc., Organic Chemistry**, Faculty of Chemistry

Employment

2002 - 2013 Assistant Professor, Div. of Biophysics, Faculty of Physics, University of Warsaw, Warsaw, Poland
2013 - now Associated Professor and Group Lider of Laboratory of Bioorganic Chemistry, Centre of New Technologies University of Warsaw, Poland

Research Interests

- Organic chemistry, bioorganic chemistry and biochemistry.
- Analogs of biologically relevant nucleotides: synthesis and applications in biochemical, biophysical and biological studies.
- Synthesis of mRNA cap analogs and their biological and medicinal applications.
- Fluorescent, NMR and biological labeling of nucleotides and oligonucleotides.

Publications

Co-author of 88 publications

H-index: 18

Number of citations: 1042

Complete bibliographic data available with ORCID number: 0000-0001-7633-788X

Selected publications:

- Przemyslaw Wanat, Sylwia Walczak, Blazej A. Wojtczak, Monika Nowakowska, Jacek Jemielity, and Joanna Kowalska,* Ethynyl, 2-Propynyl, and 3-Butynyl C-Phosphonate Analogues of Nucleoside Di- and Triphosphates: Synthesis and Reactivity in CuAAC, *Org. Lett.*, 2015, **17**, pp 3062–3065
- Marek R. Baranowski, Anna Nowicka, Anna M. Rydzik, Marcin Warminski, Renata Kasprzyk, Blazej A. Wojtczak, Jacek Wojcik, Timothy D. W. Claridge, Joanna Kowalska,* and Jacek Jemielity* Synthesis of Fluorophosphate Nucleotide Analogues and Their Characterization as Tools for ¹⁹F NMR Studies, *J. Org. Chem.*, 2015, **80**, pp 3982–3997

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- Marcin Warminski, Zofia Warminska, Joanna Kowalska,* and Jacek Jemielity* mRNA Cap Modification through Carb-amate Chemistry: Synthesis of Amino- and Carboxy-Functionalised Cap Analogues Suitable for Labelling and Bioconjugation, *Eur. J. Org. Chem.*, **2015**: 6153–6169.
 - Joanna Kowalska, Anna Wypijewska del Nogal, Zbigniew M Darzynkiewicz, Janina Buck, Corina Nicola, Andreas N Kuhn, Maciej Lukaszewicz, Joanna Zuberek, Malwina Strenkowska, Marcin Ziemniak, Maciej Maciejczyk, Elzbieta Bojarska, Robert E Rhoads, Edward Darzynkiewicz, Ugur Sahin, Jacek Jemielity*, Synthesis, properties, and biological activity of boranophosphate analogs of the mRNA cap: versatile tools for manipulation of therapeutically relevant cap-dependent processes. (2014) *Nucl Acids Res* **42** (16), 10245-10264.
 - Zochowska M., Piguet A-C., Jemielity J., Kowalska J., Szolajska E., Dufour J.F., Chroboczek J.,* Virus-like particle-mediated intracellular delivery of mRNA cap analog with in vivo activity against hepatocellular carcinoma, (2015) *Nanomedicine: Nanotechnology, Biology and Medicine* **11** (1), 67–76
 - Strenkowska M., Wanat P., Ziemniak M., Jemielity J.*, Kowalska J.*, Preparation of Synthetically Challenging Nucleotides Using Cyanoethyl P-Imidazolides and Microwaves. (2012) *Organic Letters* **14**, 4782-4785.
 - Rydzik, A. M., Kulis, M., Lukaszewicz, M., Kowalska, J., Zuberek, J., Darzynkiewicz, Z. M., Darzynkiewicz, E., Jemielity, J.*, Synthesis and properties of mRNA cap analogs containing imidodiphosphate moiety - fairly mimicking natural cap structure, yet resistant to enzymatic hydrolysis. *Bioorganic and Medicinal Chemistry* **20**, 1699-1710 (2012).
 - SA Szczepaniak, J Zuberek, E Darzynkiewicz, J Kufel, J Jemielity, Affinity resins containing enzymatically resistant mRNA cap analogs—a new tool for the analysis of cap-binding proteins, *RNA* **18** (7), 1421-1432
 - J Jemielity, J Kowalska, AM Rydzik, E Darzynkiewicz, Synthetic mRNA cap analogs with a modified triphosphate bridge—synthesis, applications and prospects, (2010) *New Journal of Chemistry* **34** (5), 829-844
 - AN Kuhn, M Diken, S Kreiter, A Selmi, J Kowalska, J Jemielity, E Darzynkiewicz, C Huber, Ö Türeci, U Sahin, Phosphorothioate cap analogs increase stability and translational efficiency of RNA vaccines in immature dendritic cells and induce superior immune responses in vivo (2010) *Gene therapy* **17** (8), 961-971
 - Kowalska, J., Lewdorowicz, M., Zuberek, J., Grudzien-Nogalska, E., Bojarska, E., Stepinski, J., Rhoads, R. E., Darzynkiewicz, E., Davis, R. E., and Jemielity, J*. Synthesis and characterization of mRNA cap analogs containing phosphorothioate substitutions that bind tightly to eIF4E and are resistant to the decapping pyrophosphatase DcpS (2008) *RNA* **14**, 1119-1131
 - Zdanowicz A., Thermann R., Kowalska J., Jemielity J., Duncan K., Preiss T., Darzynkiewicz E., Hentze M.W., Drosophila miR2 primarily targets the m⁷GpppN cap structure for translational repression, (2009) *Molecular cell* **35** (6), 881-888
 - Deshmukh, M. V., Jones, B. N., Quang-Dang, D. U., Flinders, J., Floor, S. N., Kim, C., Jemielity, J., Kalek, M., Darzynkiewicz, E., and Gross, J. D. mRNA decapping is promoted by an RNA-binding channel in Dcp2 (2008) *Mol. Cell* **29**, 324-336
 - Jemielity J., Tolvert F., Zuberek J., Stepinski J., Lewdorowicz M., Niedzwiecka A., Stolarski R., Darzynkiewicz E., Rhoads R.E. Novel “anti-reverse” cap analogs with superior translational properties (2003) *RNA* **9** (9), 1108-1122

Patents

- Jemielity J., Grudzien-Nogalska E., Kowalska J., Darzynkiewicz E., Rhoads R.E "Synthesis and use of anti-reverse phosphorothioate analogs of the messenger RNA cap" US Patent 8, 153, 773, April 10 2012.
- Kowalska J. Jemielity J., Darzynkiewicz E., Rhoads R.E., Lukaszewicz M., Zuberek J. "mRNA Cap Analogs" US Patent US8519110 (issued 27.08.2013)

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- Jemielity J., Grudzien-Nogalska E., Kowalska J., Darzynkiewicz E., Rhoads R.E. "Cząsteczka RNA oraz sposób otrzymywania peptydów lub białka". Patent no P 214850 issued 26.02.2013 by the Polish Patent Office
 - Jemielity J., Grudzien-Nogalska E., Kowalska J., Darzynkiewicz E., Rhoads R.E "Synthesis and use of anti-reverse phosphorothioate analogs of the messenger RNA cap" Australian Patent 2008265683 (issued 12.12.2013)
 - Kowalska J. Jemielity J., Darzynkiewicz E., Łukaszewicz M., Żuberek J. "Nowe boranofosforanowe analogi dinukleozydów, ich zastosowanie, cząsteczka RNA, sposób otrzymywania RNA, oraz otrzymywania peptydów lub białka." Patent no P 215513 issued 31.12.2013 by the Polish Patent Office
 - 4 patent applications

Research support

Ongoing research support:

NCN UMO/2012/05/E/ST5/03893

PI: Jemielity

2013-2018

Grant from the National Center of Science (Poland)

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

Role: PI

NCN UMO/2013/09/B/ST5/01341

PI: Jemielity

2014-2017

Grant from the National Center of Science (Poland)

New methods for mRNA 5' end labeling and examples of their application in studies on RNA metabolism and searching for inhibitors of cap-structure-recognizing proteins with therapeutic relevance

Role: PI

STRATEGMED ID 235773

PI: Mirosław Janowski

2015-2017"EXPLORE ME" Consortium: "Exploitation of Regenerative Potential of Mesenchymal Stem Cells" (Project Proposal) funded by National Centre for Research & Development (NCR&D) within the STRATEGMED program.

Role: PI of workpackage

Participation in 5 other research projects from the National Center of Science and Ministry of Science and Higher Education (project executor or supervisor of the Ph.D. student)

Previous support:

Participation in 10 research projects as an executor (6), PI (1) and coordinator (1), supervisor (2).

Research Experience

August 2002 one month training in dr Jadwiga Chroboczek group at Institute of Structural Biology, Grenoble, France

June-August 2003 three months training in prof. Harri Lonnberg group in University of Turku, Turku, Finland

Teaching Experience

Lecturer:

- Bioorganic Chemistry (*for B.Sc. students of Application of Physics in Biology and Medicine, Faculty of Physics UW*)
- Medicinal Chemistry and Drug Design (*for M.Sc. students of APBM*)
- Mechanism and organic and bioorganic reactions (*for M.Sc. students of APBM*)

Teaching Assistant:

- Laboratory of Chemistry (*for B.Sc. students of APBM*)
- Advanced Biophysics Lab (*for B.Sc. students of APBM*)

Supervisor:

- Supervisor of 20 M.Sc. alumni and 11 B.Sc. alumni
- Supervisor of 13 current Ph.D students
- Supervisor of 4 current M.Sc. students and current 4 B.Sc. students

Awards and Distinctions

- 2011 University of Warsaw Rector's award (2nd degree) for scientific achievements
- 2008 Rector Grzegorz Bialkowski Award from Faculty of Physics, University of Warsaw for "Designing and chemical synthesis of mRNA cap analogues and biophysical studies of their interaction with protein factors".
- 2008 Stipend of The Polityka Foundation "Stay with us" VIII edition.
- 2004 University of Warsaw Rector's award (3rd degree) for scientific achievements
- Scientific stipend of The Rector of The University of Warsaw in years 2004, 2005, 2006, 2007