

Preface

Nikolay E. Nifantiev*

Research papers from the 21st Mendeleev Congress on General and Applied Chemistry

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The 21st Mendeleev Congress on General and Applied Chemistry was held on 9–13 September 2019 in Saint Petersburg under the auspices of IUPAC. Mendeleev Congresses are the main Russian chemical forums which, typically, take place every 4 or 5 years, and usually proceed in major regional centers of the country. Saint Petersburg is one of the biggest industrial, cultural and scientific centers of Russia with renowned universities, academic research institutes and industrial corporations, including giant metallurgical plants.

The first Mendeleev Congress was held in Saint Petersburg in 1907 in memory of the prominent Russian chemist D. I. Mendeleev (1834–1907). Further Congresses were held in a number of famous scientific centers all over the former USSR: in Moscow, Volgograd, Leningrad (now Saint Petersburg), Kazan, Kharkov, Kiev, Alma-Ata, Baku, Tashkent, and Minsk. The 19th Mendeleev Congress (Volgograd, 2016) was associated with the International Year of Chemistry, while the jubilee 20th Congress (Ekaterinburg, 2016) was dedicated to “New horizons of chemistry in the 21st century”.

The 21st Mendeleev Congress was associated with worldwide celebration of the 150th anniversary of Dmitry Mendeleev’s discovery of the Periodical Table. It was proclaimed by the United Nations General Assembly in December 2017 as the “International Year of the Periodic Table of Chemical Elements” (IYPT 2019) following the initiative by the Russian Federation supported by IUPAC, the International Union of Pure and Applied Physics (IUPAP), the European Association of Chemical and Molecular Sciences (EUCHEMS), the International Council for Science (ICS), the International Astronomical Union (IAU) and the International Union of History and Philosophy of Science and Technology (IUHPS) and of numerous scientific organizations from more than 80 countries.

Led by UNESCO, IYPT 2019 brought together hundreds of national and international partners to raise awareness of the importance of chemistry and periodicity in areas such as sustainable development, health, food, water, energy, education, climate change and biodiversity. All the above listed critical topics were discussed during the 21st Mendeleev Congress which traditionally welcomed scientists from all over the world and provided the highest level of scientific discussion on contemporary problems in various areas of modern chemistry. It also provided a wide range of participants (students, graduate students, teachers, researchers from different countries) a possibility to get in touch with the world advanced scientific achievements in the

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Nikolay E. Nifantiev: IUPAC Division III President.

***Corresponding author: Nikolay E. Nifantiev**, Laboratory of Glycoconjugate Chemistry, N.D. Zelinsky Institute of Organic Chemistry, Russian Academy of Sciences, Leninsky Prospect, 47, Moscow, 119991, Russia, e-mail: nen@ioc.ac.ru. <https://orcid.org/0000-0002-0727-4050>

field of chemistry including its fundamental aspects and industrial achievements. That is why Mendeleev Congresses are recognized as the largest Russian scientific events focusing on most priority directions of chemical research. They traditionally maintain interdisciplinary programs that highlight new research prospects, as well as advances in chemical industry and professional education. In addition to the scientific discussions, Mendeleev Congresses feature the networking links between business, industry and academy.

The 21st Mendeleev Congress was co-chaired this time by the President of the Russian Academy of Sciences, Academician Alexander M. Sergeev, Russian Minister of Science and Education Mr. Mikhail M. Kotukov and Vice-governor of Saint Petersburg Mr. Vladimir V. Kirillov, while the Program Committee was chaired by Academician Aslan Yu. Tsivadze – the President of Dmitry I. Mendeleev Russian Chemical Society and Deputy Secretary of the Division of chemistry and material sciences of RAS.

The Congress was opened by Academician Alexander M. Sergeev who delivered the address to the Congress from the President Vladimir V. Putin. Next talk was delivered by the Russian Prime Minister Mr. Dmitry A. Medvedev who emphasized on the importance of the discovery of Periodic Law which is acted now as the common language for science and outlined importance of chemistry nowadays. The Prime Minister also informed the Congress participants about the initiative of the Government of the Russian Federation which proposed in the connection of IYPT 2019 to establish and fund the joint UNESCO/Russian Federation International Prize in the name of the Russian chemist Dmitry I. Mendeleev for the Basic Sciences. Soon after the Congress at the 207th session of the UNESCO Executive Board it was decided to establish the Dmitry I. Mendeleev UNESCO-Russia International Prize for Achievements in the Basic Sciences. The UNESCO Executive Board adopted the decision by acclamation supporting the establishment of the Prize by applause.

Over 2500 Russian scientists and their colleagues from 60 foreign countries from all over the world (they included about 1300 young researchers and students) took part in the extensive scientific program. It included plenary sessions, 10 parallel sections, 5 international satellite symposia, conference of young researchers “Mendeleev-2019”, 4 round table discussions and poster sessions – altogether they broadly covered essential directions of chemical science, technology and education including material sciences and nanotechnology, molecular electronics, supramolecular chemistry, electrochemical power engineering, catalysis, energy resources and raw materials, reproducible biomass conversion and biorefinery, drug discovery and biomolecular chemistry, immunological and biochemistry, agrochemistry, ecology and many other directions of chemistry and related interdisciplinary studies. Plenary sessions of the Congress comprised 17 outstanding talks by distinguished scientists including Nobel Prize winners Professor Jean-Pierre Sauvage (2016 laureate) and Professor William E. Moerner (2014 laureate), Academician Yuri T. Oganessian, Sir Martin Poliakoff (School of Chemistry, University of Nottingham).

As the President of the Division of organic and biomolecular chemistry of IUPAC I am honored to dedicate this and one of the following issues of *Pure and Applied Chemistry* to the 21st Mendeleev Congress. It comprises selected papers related to plenary contributions, keynote and invited lectures presented at the Congress.

I am very grateful to Professor Hugh Burrows, Scientific Editor of *Pure and Applied Chemistry* for his kind consent to dedicate this issue to the 21st Mendeleev Congress, and all authors for their contributions which present modern chemistry and its indispensable importance for sustainable development.

Bionote



Nikolay E. Nifantiev

Laboratory of Glycoconjugate Chemistry, N.D. Zelinsky Institute of Organic Chemistry, Russian Academy of Sciences, Leninsky Prospekt, 47, Moscow, 119991, Russia

nen@ioc.ac.ru

<https://orcid.org/0000-0002-0727-4050>

Prof. Nikolay E. Nifantiev. The Corresponding Member of RAS, IUPAC Titular Member, President of IUPAC Organic and biomolecular chemistry Division (2020–2021); Chair of “Organic Synthesis” Sub-committee (2016–2020), Head of the Laboratory of Glycoconjugate Chemistry, N. D. Zelinsky Institute of Organic Chemistry, RAS, Leninsky, Prospekt 47, 119991 Moscow, Russian Federation.