



International Year of the Periodic Table of Chemical Elements

Closing Ceremony

Prince Hotel, Tokyo, Japan 5 December 2019



https://iypt.jp/

M essages from the organizers

Prof. Jan Reedijk and Prof. Natalia Tarasova

Co-Chairs of the Inter-Union Management Committee IYPT



On behalf of the Inter-Union Management Committee, it is a real pleasure to welcome you to the Closing Ceremony of the International Year of the Periodic Table (IYPT2019).

The Periodic Table is one of the most significant achievements in science, capturing the essence not only of chemistry but also of other science areas, such as physics, astronomy and biology. It is a unique tool that enables scientists to predict the appearance and properties of matter on Earth and in the rest of the Universe. In proclaiming an International Year focusing on the Periodic Table and its applications, the United Nations has recognized the importance of raising global awareness of how chemistry promotes sustainable development and how it provides solutions to global challenges in energy, education, agriculture and health.

IYPT2019 has brought together a large variety of different stakeholders, including UNESCO, scientific societies in chemistry and physics, as well as scientific unions, learned societies, educational and research institutions, technology platforms, non-profit organizations and private sector partners, to promote and celebrate the significance (in science and education) of the Periodic Table of Elements, including its applications to society.

On January 29, 2019, the flagship opening ceremony was celebrated with over 700 delegates from over 50 countries in Paris at the UNESCO premises. Since then, we have celebrated worldwide the Periodic Table in the format as proposed by Mendeleev in 1869 and its developments until today. There have been too many events to list, but we mention as an example the celebration of the International Day of Women and Girls in Science ("Setting their Table: Women and the Periodic Table of Elements", International Symposium at the University of Murcia (Spain) on 11-12 February, 2019), which highlighted women role models who have made a substantial contribution to the discovery of elements of the Periodic Table. These women were celebrated in line with the gender equality priority of UNESCO and also in view of the advancement of the 2030 Agenda for Sustainable Development.

IYPT2019 has no doubt enhanced international cooperation by coordinating activities between learned societies, educational establishments and industry, focusing specifically on new partnerships and initiatives in the developing world, and has established durable partnerships to ensure that these activities, goals and achievements continue in the future beyond the year 2019.

We are grateful to our Japanese colleagues for their acceptance to host and take the responsibility for the Grand Closing Ceremony! We wish them all kinds of success and look forward to an unforgettable event.



Prof. Kohei Tamao

Chair of the Executive Committee for IYPT2019 in Japan

On behalf of the Executive Committee for IYPT2019 in Japan, and in cooperation with the IYPT2019 Management Committee, I am very happy to welcome you to the closing ceremony of the International Year of the Periodic Table 2019 (IYPT2019) in Japan.

IYPT2019 marks 150 years since Dmitri Mendeleev's discovery of the periodic system and his arrangement of the 61 then-known elements into the Periodic Table. It is a celebration of Mendeleev's discovery, and also a celebration of the beauty of the Periodic Table that we know today, now complete up to the seventh period with 118 elements after the last four elements were named in 2016.

The closing ceremony of IYPT2019 gives us the chance to look back on the many activities that have been held around the world to celebrate the Periodic Table during IYPT2019. These activities have celebrated the work of the scientists and engineers who contributed to the discovery and development of the Periodic Table, and the work of those who use the elements to contribute to our world. They also look to the future, to the next generation of scientists, who will use the hints given by the Periodic Table and the characteristics of the elements to create "future materials" that will further enrich our lives.

For example, in Japan, we have invited researchers from academia and industry to publish messages about the elements that are most important to them, organized an essay contest for the next generation of scientists in schools and universities to tell us what the elements mean to them, and taken our "Special Exhibition Tour of the Periodic Table" around the country to pass down our enthusiasm for the Periodic Table and science from one generation to the next and beyond.

With the closing ceremony of IYPT2019, we also look to the future of the current generation of scientists, and expect the exhibition, which includes interactive activities and displays from industry and academia, to become a place for exchange between scientists and engineers of all nationalities and from all backgrounds and fields.

I believe that the momentum created from this international year of activities to promote the Periodic Table around the world will continue into the future and further reaffirm the importance of the elements in our lives. My hope is that through familiarity with the Periodic Table and realization of the benefits of science and technology in everyday life, science will become a culture that is transmitted from parents to children and from children to grandchildren for many generations to come.

Our various activities for IYPT2019 were supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Ministry of Economy, Trade and Industry (METI), and the Japan National Commission for UNESCO, and have been sponsored by many companies, academic institutions, and academic associations. I would like to take this opportunity to thank all of them for making the various activities of IYPT2019 in Japan a success.

S peakers

Opening Welcome addresses



Prof. Maki Kawai President, Chemical Society of Japan; Director General, Institute for Molecular Science; Professor Emeritus, The University of Tokyo, Japan



Prof. Natalia Tarasova Past President, IUPAC; Co-Chair, Inter-Union Management Committee IYPT2019



Prof. Grigory Trubnikov Doctor of Physics and Mathematics, RAS Academician; First Deputy Minister of Science and Higher Education of the Russian Federation



Prof. Kohei Tamao Chairman, Executive Committee for IYPT2019 in Japan



Ms. Audrey Azoulay Director General, UNESCO



Prof. Hiroshi Matsumoto President of RIKEN, Japan



Mr. Alisher Burkhanovich Usmanov Art, Science and Sport Charity

Foundation, Russian Federation

Opening Congratulatory addresses

Dr. Miyoko O. Watanabe Vice President, Science Council of Japan



Prof. David Cole-Hamilton Past President, EuChemS; Former Council Member, RSC



Prof. Zhigang Shuai Vice President, Chinese Chemical Society



Prof. Aslan Tsivadze

President, Mendeleev Russian Chemical Society; Head, Materials Science Section of the Russian Academy of Sciences



Dr. Bonnie Charpentier President, American Chemical Society



Prof. Hyun-Joon Ha President, Korean Chemical Society



Activities in IYPT2019



Prof. Ken Sakai Kyushu University, Japan



Prof. Grigory Trubnikov Doctor of Physics and Mathematics, RAS Academician; First Deputy Minister of Science and Higher Education of the Russian Federation



Mr. Yoji Hisamatsu Ehime Prefectural Science Museum; Vice-Chair, Expert Subcommittee of the Executive Committee for IYPT2019 in



Dr. Lynn M. Soby IUPAC Executive Director



Prof. Mei-Hung Chiu Distinguished Professor, National Taiwan Normal University, Graduate Institute of Science Education



Japan

IYPT events in the world



Prof. Jan Reedijk Co-Chair, Inter-Union Management Committee IYPT2019



Prof. Christopher Brett Vice President, IUPAC



Dr. Bipul Behari Saha Director - R&D, L.R. Research Laboratories. NACL Industries. India



Dr. Brigitte Van Tiggelen Science History Institute, Chair of the Commission for the History of Chemistry and the Molecular Sciences, International Union for the History and Philosophy of

Discoveries of chemical elements



Prof. Yoshiteru Maeno Kyoto University, Japan



Mr. Renaud Huynh Director, Curie Museum in Paris, France



Prof. José Ramón **Bertomeu-Sánchez** Institute "López Piñero" for the History of Medicine and Science, University of Valencia, Spain



8:00 -	Registration and visit to the exhibition booths									
10:00 -10:05	Musical performance									
10:10 -11:30	Opening [Chaired by Maki Kawai]									
	Welcome addresses: Prof. Kohei Tamao (Chairman, Executive Committee for IYPT2019 in Japan) Prof. Natalia Tarasova (Past President, IUPAC; Co-Chair, Inter-Union Management Committee IYPT2019) Ms. Audrey Azoulay (Director General, UNESCO) Prof. Grigory Trubnikov (Doctor of Physics and Mathematics, RAS Academician; First Deputy Minister of Science and Hickor Education of the Pursion Education)									
	Prof. Hiroshi Matsumoto (President of RIKEN, Japan)									
	Mr. Alisher Burkhanovich Usmanov (Art, Science and Sport Charity Foundation, Russian Federation)									
	Congratulatory addresses: Representative from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan (TBC) Dr. Miyoko O. Watanabe (Vice President, Science Council of Japan) Prof. Aslan Tsivadze (President, Mendeleev Russian Chemical Society; Head, Materials Science Section of									
	Prof. David Cole-Hamilton (Past President, EuChemS; Former Council Member, RSC) Dr. Bonnie Charpentier (President, American Chemical Society) Prof. Zhigang Shuai (Vice President, Chinese Chemical Society) Prof. Hyun-Joon Ha (President, Korean Chemical Society)									
11:30 -12:00	Activities in IYPT2019 [Chaired by Ken Sakai] Dr. Lynn M. Soby (IUPAC Executive Director) "Periodic Table of Younger Chemists"									
	 Presentations on IYPT Exhibitions from Russia, China/Taipei, and Japan Prof. Alexey Khokhlov (Vice President, Russian Academy of Sciences) "IYPT2019 Activities in Russia" Prof. Mei-Hung Chiu (Distinguished Professor, National Taiwan Normal University, Graduate Institute of Science Education) "IYPT in Taiwan" Mr. Yoji Hisamatsu (Ehime Prefectural Science Museum; Vice-Chair, Expert Subcommittee of the Executive Committee for IYPT2019 in Japan) "IYPT Japan Exhibition Highlights" 									
12:00 -14:00	Lunch and visit to the exhibition booths									
14:00 -14:40	IYPT events in the world [Chaired by Jan Reedijk]									
	Events in the World Video summary: Mr. Frank Sekeris Dr. Bipul Behari Saha (Director - R&D, LR. Research Laboratories, NACL Industries, India) "IYPT Celebrations in India" Prof. Christopher Brett (Vice President, IUPAC) "Periodic Table Challenge" Dr. Brigitte Van Tiggelen (Science History Institute, Chair of the Commission for the History of Chemistry and the Molecular Sciences International Union for the History and Philosophy									

of Science and Technology) "Women and the Periodic Table in Chemistry"

14:40 -14:50	Musical performance										
14:50 -15:30	Discoveries of chemical elements [Chaired by Yoshiteru Maeno]										
	14:50-15:10 Prof. José Ramón Bertomeu-Sánchez (Institute "López Piñero" for the History of Medicine and Science, University of Valencia, Spain) [Video Presentation]										
	"Periodic Classifications in Action: Arranging and Discovering Elements during the 19th and Early 20th Century"										
	15:10-15:30 Mr. Renaud Huynh (Director, Curie Museum in Paris, France) "Discovery of Radioactive Elements"										
15:30 -16:00	Creation of superheavy elements [Chaired by Hideto En'yo] Scientists who created and discovered superheavy elements will appear on stage to celebrate the completion of the 7th row of the Periodic Table. Special speeches will be given by prominent scientists from the laboratories that contributed largely to the discoveries. Ms. Honoka Motai (Student, Tokyo Gakugei University Senior High School, Japan) will play her piano fantasy "Nihonium" to celebrate the occasion.										
16:00 -16:20	Short break										
16:20 -16:50	Periodic Table for the next generation (I) [Chaired by Mihoko Nojiri] Award ceremony for the essay contest in Japan Short speeches by the awardees										
16:50 -17:30	Periodic Table for the next generation (II) [Chaired by Hiroyoshi Sakurai] Prof. Alexander Sergeev (President, Russian Academy of Science)										
	Prof. Sir Martyn Poliakoff (University of Nottingham, UK) [Video message]										
	Prof. Makoto Kobayashi (Honorary Professor Emeritus, High Energy Accelerator Research Organization (KEK), Japan; Nobel Laureate in Physics (2008))										
	Dr. Akira Yoshino (Honorary Fellow, Asahi Kasei Corporation, Japan; Nobel Laureate in Chemistry (2019)) [Video message]										
	Short speeches by children (Honoka Motai, Riku Kakuhata, Licht J. Nagamori)										
17:30 -17:50	Closing [Chaired by Maki Kawai] Prof. Qi-Feng Zhou (President, IUPAC)										
	Prof. Bruce McKellar (Past President, IUPAP)										
	Prof. Junichi Watanabe (Vice President, International Astronomical Union)										

Finale: Musical performance by the "Orchestra Chimica"



Creation of superheavy elements



Dr. Hideto En'yo Director, RIKEN Nishina Center for Accelerator-Based Science, Japan



Dr. Karlheinz Langanke Research Director, GSI Helmholtzzentrum für Schwerionenforschung, Germany



Dr. Mark Stoyer Senior Staff Scientist, Nuclear and Chemical Sciences Division, Lawrence Livermore National Laboratory, USA



Prof. Kosuke Morita

Group Director, Research Group for Superheavy Element, RIKEN Nishina Center; Professor, Kyushu University, Japan

Ms. Honoka Motai Student, Tokyo Gakugei University Senior High School, Japan

Prof. Mikhail Itkis

Vice-Director, Joint Institute for Nuclear Research, Russian Federation

Prof. Michael Block

Head of the Superheavy Element Physics Departments, GSI Helmholtzzentrum für Schwerionenforschung and Helmholtz Institute Mainz; Professor for Physics of Superheavy Elements, Institute of Nuclear Chemistry, Johannes Gutenberg University Mainz, Germany





Director, Joint Institute for Nuclear Research, Russian Federation



Dr. Roderick Clark Senior Staff Scientist, Lawrence Berkeley National Laboratory, USA



Dr. Krzysztof Rykaczewski Senior Staff Researcher, Oak Ridge

National Laboratory, USA



Dr. Yuri Oganessian

Scientific Leader, Flerov Laboratory of Nuclear Reactions, Joint Institute for Nuclear Research, Russian Federation

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Dr. Alexander Yakushev

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Dr. Dieter Ackermann

Senior Scientist, Grand Accélérateur National d'Ions Lourds, France

Dr. Kouii Morimoto

Nishina Center, Japan

Federation

Team Leader, Superheavy Element

Device Development Team, RIKEN

Dr. Vladimir Utyonkov

Properties of Superheavy Nuclei, Flerov

Laboratory of Nuclear Reactions, Joint

Institute for Nuclear Research, Russian

Prof. Christoph Duellmann

Johannes Gutenberg University Mainz;

Schwerionenforschung and Helmholtz

Professor for Nuclear Chemistry,

Head of the Superheavy Element

Chemistry Departments, GSI

Helmholtzzentrum für

Institute Mainz, Germany

Institute of Nuclear Chemistry,

Head of Sector, Synthesis and

Dr. Jadambaa Khuyagbaatar

Staff Scientist, Superheavy Element Chemistry, Helmholtz-Institut Mainz and GSI Helmholtzzentrum für Schwerionenforschung, Germany

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Periodic Table for the next generation



Prof. Mihoko Nojiri High Energy Accelerator Research Organization (KEK), Japan





School of Science, The University of Tokyo; RIKEN Nishina Center for Accelerator-Based Science, Japan



Prof. Alexander Sergeev President, Russian Academy of Science



Prof. Sir Martyn Poliakoff University of Nottingham, UK



Prof. Makoto Kobayashi Honorary Professor Emeritus, High Energy Accelerator Research Organization (KEK), Japan; Nobel Laureate in Physics (2008) ©KEK



Dr. Akira Yoshino Honorary Fellow, Asahi Kasei Corporation, Japan; Nobel Laureate in Chemistry (2019)

by courtesy of Asahi Kasei

Ms. Honoka Motai Student, Tokyo Gakugei University Senior High School, Japan

Mr. Riku Kakuhata Student, Kaisei Junior High School, Japan

Mr. Licht J. Nagamori Student, Gyosei International Primary School, Japan

Closing



Prof. Qi-Feng Zhou President, IUPAC



Prof. Bruce McKellar Past President, IUPAP



Prof. Junichi Watanabe Vice President, International Astronomical Union

L ooking to the future

Prof. Maki Kawai

President, Chemical Society of Japan; Director General, Institute for Molecular Science; Professor Emeritus, The University of Tokyo, Japan



The starting point for the Periodic Table is 1869, when Russian chemist Dmitri Mendeleev discovered periodicity in the properties of the 61 elements that were known at the time. This discovery is one of the most significant achievements in science and, as is the case for all scientific discoveries, builds on a huge body of older work. After Lavoisier's 1789 definition of an element as "a simple substance" that could not be divided further, the world's chemists had long been searching for order in the known chemical elements. Döbereiner published the "Law of Triads" in 1829, and in 1862, De Chancourtois noted that elements with similar properties were aligned if the elements were arranged into a spiral in order of increasing atomic weight. Later in the same decade, Newlands proposed the "Law of Octaves" and Meyer published a table that came very close to that published by Mendeleev.

In 1869, Mendeleev arranged the then-known elements in order of atomic weight to create a prototype of the Periodic Table that we know today. Importantly, in his table the periodicity of the chemical properties of the elements dominated over their atomic weights, and he left gaps for as-yet undiscovered elements. Over the past 150 years, Mendeleev's work has been expanded and those "undiscovered elements" have now been discovered through isolation from nature by careful examination of minerals, or by artificial synthesis using modern accelerator facilities. We now have the most beautiful Periodic Table in history: one that is complete up to the seventh period with 118 elements. Today's Periodic Table is thus the fruit of the work and intelligence of many generations of researchers who have combined their efforts and resources to create a source of knowledge for scientists in the generations to come.

I strongly believe that current and future generations of scientists will build on the wisdom of their predecessors and use the hints generated by the Periodic Table to take full advantage of the distinctive characteristics of each element listed in the Periodic Table to enrich all aspects of our human society. I look forward to the "future materials" that will be created through their talents and the benefits that they will bring to our lives. However, the elements are finite resources, and it also lies with our current and future scientists to address this problem by finding new ways to advance the frontiers of knowledge while preserving the world's resources and protecting the natural environment.

Over the last year, during the International Year of the Periodic Table (IYPT2019), we have celebrated the 150th anniversary of Mendeleev's discovery as well as the completion of the seventh period of the Periodic Table, which was achieved with the naming of the last four elements in 2016. IYPT2019 started in January with the opening ceremony in Paris, has been marked around the world with discussions, exhibitions, performances, craft activities, competitions and more on six continents, and is now coming to an end at the closing ceremony here in Tokyo. We have celebrated the Periodic Table and the work of the scientists and engineers who contributed to its discovery and of those who use the elements to further expand knowledge and improve our lives. These celebrations have brought together scientists young and old from all corners of the globe, helping us to forge new connections and develop new ideas that I'm sure will lead to new solutions to the problems facing the world today. Let's ensure that this momentum continues past the end of IYPT2019, and work together towards the International Year of Basic Sciences for Development (IYBS4D) in 2022 and a bright future beyond.

Thank you to our sponsors

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H 1																	He 2
Li 3	Be 4											B 5	C 6	N 7	O 8	F 9	Ne 10
Na 11	Mg 12											Al 13	Si 14	P 15	S 16	Cl 17	Ar 18
K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36
Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	TC 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54
Cs 55	Ba 56	57-71	Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Au 79	Hg 80	Tl 81	Pb 82	Bi 83	Po 84	At 85	Rn 86
Fr 87	Ra 88	89-103	Rf 104	Db 105	Sg 106	Bh 107	HS 108	Mt 109	Ds 110	Rg 111	Cn 112	Nh 113	FI 114	Mc 115	Lv 116	Ts 117	Og 118
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International Year of the Periodic Table of Chemical Elements

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