Inorganic Chemistry Division NEWSLETTER Fall 2022

Message from the President

Lidia Armelao

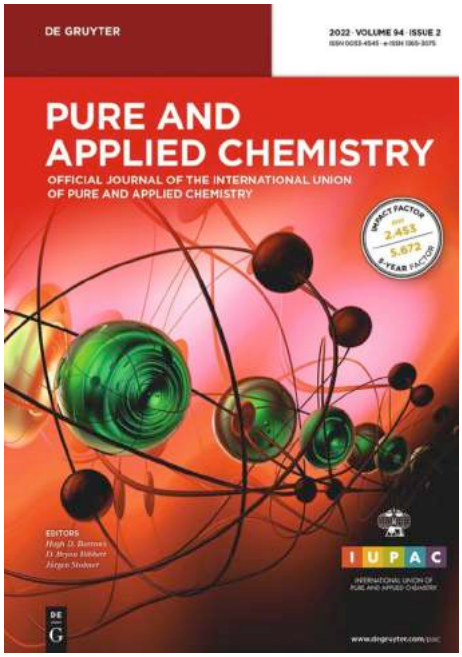
At the beginning of my term as the Division II President, I would like to express my gratitude to those who preceded me in leading our Division with commitment, enthusiasm, and vision: Lars Öhrström, former President, Javier García-Martínez, former Vice-president and current IUPAC President, and Markku Leskelä, former Secretary. I also wish to thank our valued Secretary, Daniel Rabinovich, the Titular and Associate members of the Division, and the National Representatives. Relying on your collaboration and support, I will strive to involve young researchers in Division II activities to grow future generations of chemists interested to advance IUPAC, to stimulate new initiatives on global issues that deal with every aspect of chemistry, to encourage innovative projects in collaboration with different Divisions and Commissions, and to extend the network of chemists to as many countries as possible.

After the virtual off-year Division II meeting held in June 2022, the next IUPAC General Assembly & World Chemistry Congress will take place in 2023 in The Hague, Netherlands. It represents a major IUPAC event after the pandemic of the last three years. Although our Newsletter took a pause, alleviated by the Welcome Pack issues 2020 and 2021, we should be back on track now. I wish everyone enjoyable conditions for activity in our Division, and I want to share with everyone the honor, pleasure, and responsibility of representing the IUPAC community of inorganic chemists.

The University of Padua (*Università degli Studi di Padova*), the Division President's home institution and the second oldest in Italy, is celebrating its 800 anniversary this year.

Special Issue of Pure and Applied Chemistry

Honoring Dr. Mary L. Good (1931-2019)



Authors are invited to contribute manuscripts to a special issue of *Pure and Applied Chemistry* (PAC), to be published next year in honor of **Dr. Mary L. Good** (1931-2019), a leader and pioneer in the field of inorganic chemistry. In addition to a distinguished career in academia, industry, and government, she was the first woman to be elected as head of an IUPAC technical division, serving as President of Division II (Inorganic Chemistry) from 1981 to 1985, and a member of IUPAC's Bureau and its Executive Committee for eight years (1985-1993).
https://en.wikipedia.org/wiki/Mary_L._Good

The special issue welcomes contributions from all areas of inorganic chemistry, including coordination, bioinorganic, organometallic, and materials chemistry, and original research papers as well as short reviews are acceptable.

Guest Editors: L. Armelao (Italy), L. Öhrström (Sweden), D. Rabinovich (USA), M. Hasegawa (Japan)

Report from the Division's (Virtual) Off-Year Meeting

28-29 June 2022, 3:00–6:00 CET (Zoom)

Agenda

June 28:

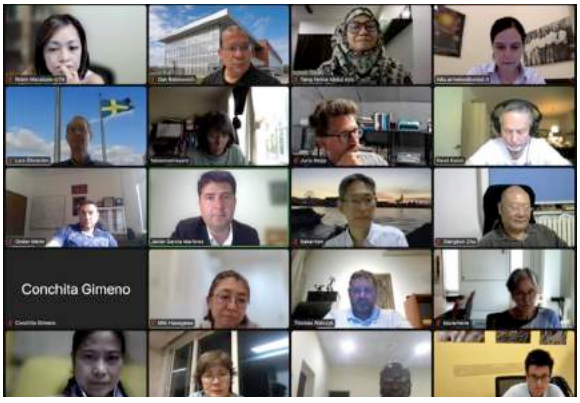
1. Welcome (J. García-Martínez, F. Meyers, L. Armelao)
2. Introduction (L. Armelao)
3. Approval of the agenda (everybody)
4. Appointment of a volunteer to make a list of "Action Items" for the meeting (L. Armelao)
5. Presentation of Division II members (everybody)
6. Special issue on PAC (M. Hasegawa, L. Armelao)
7. 49th IUPAC World Chemistry Congress and 11th CHAINS (L. Armelao)

June 29:

8. Division newsletter status and planning (D. Rabinovich)
9. Presentation of Division II projects (R. Macaluso)
10. Presentation of candidates for Division Vice President (L. Armelao)
11. CIAAW presentation (J. Mejia, J. Irrgeher)
12. New business (everyone)
13. Approval of the Action Items
14. Adjourn

Action Items

1. In line with the IUPAC focus on sustainability and the chemical science output, IUPAC President Prof. Javier García-Martínez and Dr. Fabienne Meyers (both present at the meeting) asked Division II to produce more science and generate more projects.
2. The deadline for the Special Issue of PAC on inorganic chemistry is December 31, 2022. Anyone who wishes to contribute with a topic relevant to our Division II (such as an original research article or a short review) should contact the Guest Editors of this Special Issue (Miki Hasegawa, Lidia Armelao, Lars Öhrström, Dan Rabinovich).
3. The 49th IUPAC World Chemistry Congress in Hague will organize 90 minutes "focus sessions" on a specific topic (Monday, 21 August, until Friday, 25 August, 2023), with 3×30 min talks. Division II could arrange one or two such sessions. Please, think about a relevant topic, and contact Lidia, Dan, or Lars well before the October 3, 2022 deadline for submission of the proposal. Focus on "hot" topics and those of clear scientific and/or societal relevance is welcome.
4. The divisional Newsletter will be up by the end of the next month. Please, let know Dan as soon as possible about upcoming conferences (place, date, a link) so that they can be included.
5. Committee for Chemistry Education seeks contributions on a relevant topic "How to teach/explain electronic waste and its optimal treatment". If you have an idea, contact Lidia.
6. Update on projects (see details below).
7. Update on collaborative projects (see details below).
8. New projects (see details below).
9. Vice president: Robin and Juris shall send a statement to the members of Division II.
10. Division II considered the recommendation by CIAAW to integrate the activities of the subcommittee on natural assessment of fundamental understanding of isotopes into the core competences of CIAAW. Upon request of Division II, CIAAW has now started an internal revision process with the aim to rationalize and reduce its structure where possible or needed. The outcome will be provided to Division II upon completion. A decision will be finalized at the next meeting.



Norman E. Holden (1936-2022)

In Memoriam

Norman Holden, a nuclear physicist and an enthusiastic presence at many of our Division meetings over the years, passed away on August 17th, 2022, at his home in Shoreham, New York, USA, surrounded by his wife Gail and many of his children. He was 86, and eight days shy of his 60th wedding anniversary. Norman was born and raised in New York City and received a B.S. degree in physics from Fordham University. He continued his studies at the Catholic University of America in Washington, DC, earning a Ph.D. in Nuclear Physics in 1964. He worked at General Electric's Knolls Atomic Power Laboratory, where he helped develop the iconic GE Chart of the Nuclides. From 1974 until his retirement in 2001, he worked at Brookhaven National Laboratory's National Nuclear Data Center and as a research coordinator at the High Flux Beam Reactor and the Medical Research Reactor. He was a long-time member of IUPAC and the Commission on Isotopic Abundances and Atomic Weights (CIAAW), which he served as Secretary, Vice Chair, and Chair (1979-1983). He was outgoing, jovial, witty, and an indefatigable task group member of multiple projects within our Division, including the Periodic Table of the Isotopes.

Inorganic Chemistry Division meeting in Seattle, Washington, on 13rd August 2006, hosted by Barbara and Randy Coplen.

Back row (L to R): Anthony West (Div. II President), Leonard Interrante (Secretary), Tyler Coplen, Luis Oro, Markku Leskelä, John Corish, Alan Chadwick, Kazuyuki Tatsumi (Div. II Vice President and IUPAC President 2012-13) & Norman Holden.

Front row (L to R): Sheena West, Tiping Ding, Susan Rosenblatt, Gerd Rosenblatt, Javier García-Martínez (IUPAC President 2022-23), Vita Interrante, Mrs. Chadwick & Mrs. Tatsumi.

Project Highlights

Summarized by Robin Macaluso, Projects Coordinator

2018-030-2-200 (Karen) ***Toward a comprehensive definition of valence***
The task group has evaluated the term "valence" in terms of quantitative context and discipline of the scientific literature. The task group is now working on a Technical Report aiming to describe the long history of valence as a quantity, the progress of this project, its quantitative results, the relationships between the tested quantities, and the current use of valence as a quantity.

Pavel Karen reports as follows on the Valence Project:
The project is nearing completion. Its interdivisional task group involves Divisions I, II, III, and CCE and ICTNS. Discussions about the possible project took over 5 years. As Jan Reedijk observed at the 2012 meeting in Köln, "Valence is all things to all people." Javier García Martínez noted, "Valence is the ability of an atom to bond." Indeed, valence is not merely a quantity; it appears in concepts like valence-bond theory, covalent bond, valence shell, etc. A survey conducted in 2016/7 among IUPAC chemists revealed differing perceptions of valence as a quantity. As though it had several alternative definitions. Such differing perceptions may obscure communication. We therefore applied in 2018 for a project to find out whether a comprehensive definition of valence can be formulated upon respecting the IUPAC reflectivity principle.

The project started January 26, 2019, with searches of valence terms in 33 textbooks of general, organic, inorganic, physical, and materials chemistry. A survey was evaluated for terms such as covalent(ly), valence electron(s), VSEPR, valence bond, covalency, *n*-valent, valence shell(s) not referring to VSEPR, valence energy or level(s), hypervalence and hypervalent, mixed valence and mixed valent, valence orbital, low-valent, high-valent, covalence. Besides the plain quantity *n*-valent, valence terms have three other levels of quantitative connotation, and we set up their glossary: (1) Terms of quantitative connotation but no numerical value (nouns with adjectives hypervalent, hypovalent, polyvalent, aliovalent, isovalent, heterovalent, sub-valent, semi-valent, and nouns expandable valence, saturated valence, intervalence). (2) Countable nouns (valence orbitals, -electrons, -pairs). (3) Composed terms with "valence" that have numerical value (mixed valence, bond valence, electrovalence).

Then we analyzed the history of valence as a quantity. That covered origins and development since 19th century to present; inspired by library searches of old textbooks and original articles. Then it was time for chemistry. The anonymized survey responses were converted into valence-definition preferences of evaluated consistency degree. Together with the current IUPAC definition, it gave us 9 possible valence definitions to test against chemical examples of various bonding types across the periodic table, including cases with electrons shared versus electron pairs donated. The task group has evaluated these 9 quantities on 47 sets for 38 chemical entities on several types of formulas or bonding schemes. These nine alternative quantity values for the atoms in the tested molecule, ion, or formula unit, are sensible numbers with specific meaning and mutual relationships that we evaluated. As an example, on a full Lewis formula of dimanganese decacarbonyl, these valence-type quantities on Mn atom were 1, 6, −5, 1, 6, 0, 0, 6, 6. To see which of them chemists consider as valence, we evaluated the actual current use in the tested examples by Google-Scholar searches of manuscript texts. The Technical Report will illustrate how the history of valence shaped the current use of this term as a quantity and will draw conclusions from the presented numerical results.

2020-022-1-200 (Drabik) ***Gold Book Update of Terms for Inorganic Chemistry***
The project aims to review terms and definitions contained in the Gold Book: metal–organic framework, coordination polymer, and coordination network. In addition, the *Definition of materials chemistry* will be submitted as a Recommendation.

2015-039-2-200 (Scerri) ***The Constitution of Group 3 of the Periodic Table***
The composition of Group 3 of the Periodic Table was evaluated. Some of the publications from this recently completed project: Rounding up lutetium, "What Elements Belong to Group 3 ?", Recent attempts to change the periodic table, Provisional Report on Discussions on Group 3 of The Periodic Table.

New Projects

Summarized by Robin Macaluso, Projects Coordinator

2021-027-2-600 ***The global scenario and challenges of radioactive waste in the marine environment***
(With Chem and the Environment Division (Div VI), Chem and Human Health (Div VII) and CHEMRAWN)

Radioactive material has been and continues to be discharged into the oceans. There is currently a lack of collective data on the level of radioactive contamination in marine waters. The project objectives are: to review current knowledge and understanding of radioactive waste in the oceans, provide knowledge and information of risks associated with radioactive discharge, and to provide information on current and future challenges in protecting the environment and human health.

2022-016-1-021 ***Effective teaching tools and methods to learn about e-waste***
This project involves cooperation between three standing committees and two divisions (CHEMRAWN, CCE, COCI, Division II and Division VI).

One of the recommended outcomes from the Future Actions Committee Report formulated at CHEMRAWN XXII 'E-waste in Africa' was to "Develop a course in e-waste for university students." This project will address and provide educational materials and insights for younger students and teachers working in secondary education. Knowledge about chemical problems related to e-waste handling and recycling is limited even among well-educated chemists. This is probably due to lack of focus on such topics at all stages of chemical education. The objective of this IUPAC project is to prepare and collect teaching materials related to e-waste from a chemical perspective and share these as widely as possible. This will be achieved through publication of a special issue of *Chemistry Teacher International* and a webinar. We note that *CTI* is an open access journal, and this will allow broad dissemination in the chemical education community worldwide.

November 2022 update:

A **Call for papers for a special issue of *Chemistry Teacher International*** concerning the theme: "Effective teaching tools and methods to learn about e-waste" has been released (see full text, *News* 7 Nov 2022 or pdf). The issue will contain 10 to 12 articles that describe methods and teaching tools to learn about e-waste. Preferably, the article should demonstrate ways to teach high-school and/or university students about the problem of and potential solutions to e-waste. This could include in-class exercises, laboratory experiments, demonstrations or other activities. The article can include calculations, schemes and illustrations to help make the method clear. The length of the article should be about 5000 words. CTI will allow authors to share materials they have prepared for their own classes or outreach activities. If accepted, the articles and any supporting materials will be submitted to Chemistry Teacher International (by June 30, 2023). Contributors will also be invited to take part in a webinar on e-waste education from a chemical perspective for the 2023 edition of the Global Conversation on Sustainability.
See also the resources folder on e-waste compiled by CHEMRAWN at iupac.org/e-waste/

New idea:
Definition of metalloid

Dan Rabinovich would lead this project, with the task group to find out whether there is a wide general agreement in the chemical community about which elements are metalloids and how to define these elements. Anybody interested in the project should contact Dan for further information.

Upcoming Conferences

49th IUPAC World Chemistry Congress & 11th CHAINS (20-25 August 2023)
The Hague | The Netherlands
https://iupac2023.org

Abstracts (oral & poster):
Submission opens: December 12, 2022
Deadline: February 15, 2023

Registration:
Early registration opens: February 15, 2023
Regular registration opens: June 1, 2023
Late registration starts: August 4, 2023

ACC 2023
19th Asian Chemical Congress
9-14 July 2023
Istanbul | Turkey
https://acc2023.org

ICBIC20
20th International Conference on Biological Inorganic Chemistry
16-21 July 2023
Adelaide | Australia
https://www.icbic2023.org

Alessandro Volta's Heritage and the Great Challenges for Humanity: the Past and the Future of Electrochemistry

24 October 2022

Como | Italy

https://www.iupac.cnr.it

Inorganic Chemistry Stamp

The Inorganic Chemistry Division has traditionally featured members representing "atoms", "molecules", and "materials". The postage stamp illustrated above was issued in the United States in 1955 to commemorate the "Atoms for Peace" speech highlighting the risks and peaceful uses of nuclear energy, given by U.S. President Dwight Eisenhower for the U.N. General Assembly in New York City on December 8, 1983.

Inorganic Chemistry Division Membership 2022-2023

Name	Status	Term	NAO
Prof. Lidia Armelao	TM- President	2022-2025	Italy
Prof. Lars R. Ohrström	TM- Past President	2022-2023	Sweden
Prof. Daniel Rabinovich	TM- Secretary	2020-2023	United States
Prof. Elisabeth Bouwman	TM	2022-2023	Netherlands
Dr. Jorge Colon	TM	2020-2023	Puerto Rico
Prof. Maria Concepcion Gimeno	TM	2022-2023	Spain
Prof. Mi Hee Lim	TM	2022-2023	South Korea
Prof. Philippe Knauth	TM	2020-2023	France
Dr. Juris Meija	TM	2020-2023	Canada
Prof. Thomas Walczyk	TM	2022-2023	Singapore
Prof. Yang Farina Absuk Aziz	AM	2022-2023	Malaysia
Prof. Mayoro Diop	AM	2020-2023	Senegal
Prof. Robin Macaluso	AM	2022-2023	United States
Prof. Ken Sakai	AM	2022-2023	Japan
Dr. Alessandra Sanson	AM	2022-2023	Italy
Prof. Xiangkun Zhu	AM	2022-2023	China/Beijing
Prof. Murad Aldamen	NR	2022-2023	Jordan
Prof. Haim Cohen	NR	2022-2023	Israel
Prof. Phimphaka Harding	NR	2022-2023	Thailand
Prof. Miki Hasegawa	NR	2022-2023	Japan
Dr. Rosalie Hocking	NR	2022-2023	Australia
Prof. Pavel Karen	NR	2022-2023	Norway
Dr. Lukas Krivosudsky	NR	2022-2023	Slovakia
Dr. Andrew Logsdail	NR	2022-2023	United Kingdom
Prof. Onder Metin	NR	2022-2023	Turkey
Dr. Nnaemeka Ngobiri	NR	2022-2023	Nigeria