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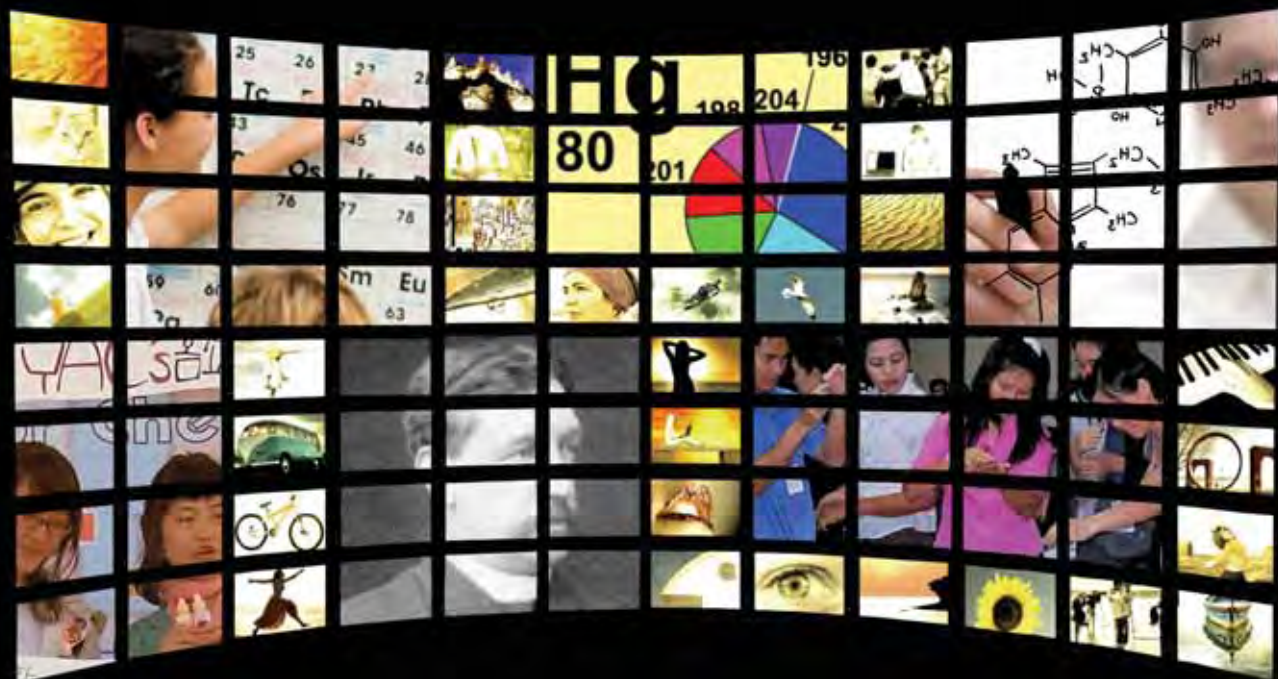
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Distance Learning in Green Chemistry



Communicating
Chemistry

Origins of the International
Congresses of Applied
Chemistry



From the Editor

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Following the recent finding of the Joint Working Party (JWP) of IUPAC and the International Union of Pure and Applied Physics (IUPAP), scientists from the Dubna-Livermore collaborations have been invited to propose a name for element 114 and for element 116 (see p. 15). IUPAC and its members are often asked what's next? How will the elements be named?

Well, over the last 20 years the process of naming new elements has left the chemistry and physics communities with quite a few lessons learned. Fortunately, these lessons have been transformed into clear pro-



cedures. First, IUPAC established criteria that must be satisfied for the discovery of a new chemical element to be recognized.¹ Then it formulated a clear path for naming the newly recognized element.²

The way the process works in practice is that a JWP of IUPAC and IUPAP publish an analysis of the claims for the synthesis of a new element. After credit is determined, the assigned laboratory is invited to propose a name and symbol for the element. This proposal is then reviewed by the IUPAC Inorganic Chemistry Division and is followed by the dissemination of a provisional recommendation and public review procedure before final recommendations are endorsed by IUPAC Council.

In 2003, this stepwise procedure resulted in the naming of element 110 as darmstadtium (Ds), recognizing the city of Darmstadt where the element was discovered. In 2004, element 111 was named roentgenium (Rg), recalling Wilhelm Conrad Roentgen's revolutionary discovery of X-rays. In 2010, the element 112 was named copernicium (Cn) to salute Nicolaus Copernicus' influential work.

The transparency in this process is such that fans of the periodic table who are eagerly anticipating the christening of new elements can rest assured that ununquadium (i.e., element 114 or Uuq) and ununhexium (element 116 or Uuh) will soon be replaced with "real" names.

According to IUPAC recommendations,² in keeping with tradition, elements can be named after a mythological concept or character; a mineral, or similar substance; a place or geographical region; a property of the element; or a scientist. Also, for linguistic consistency, the names of all new elements should end in '-ium'.

I'm no historian, but I like to think that the periodic table mirrors the history of chemistry somewhat; likewise, how new elements are named may be a reflection on our present time. Will the names inspire future generations to look at science as an amazing puzzle, an important challenge? Stay tuned—the wait for the two new official names won't be much longer.

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Vice President's Column



by *Kazuyuki Tatsumi*

In my previous column in the 2010 November-December issue, I outlined my view on the future prospects of IUPAC and emphasized that my pressing role would be to build a firm platform for a promising future for IUPAC. We have been witnessing the increasing enthusiasm of chemists through the activities

of IYC2011, which certainly gives IUPAC momentum as a world leading organization for chemistry and for science. In this contribution, I focus on two concrete items to be promoted as our mission.

Coping with the World's Needs

IUPAC has been blessed with an excellent group of expert chemists in its organization, who are gathered from all over the world. We have a responsibility to use our resources to address global needs in order to attain sustainable development of our modern society. There is no question that the power of chemistry is a prerequisite for a sustainable solution to human health and environmental problems. Therefore, IUPAC should respond promptly and properly to global interests and urgent necessities. I am confident that IUPAC will be able to do it. In this light, I point out three key issues to be considered.

- Close cooperation between academic and industrial sectors of the Union is desirable, and we may wish to strengthen the relationship. Involvement of industry in the IYC2011 activities is phenomenal. However, I was warned that IUPAC could lose ties with industry very quickly after IYC2011 if we do not demonstrate a clear vision.
- Individual chemical societies have come to grips with this important mission, and they are actively conducting projects to meet social needs and to appeal to the public. IUPAC may need to communicate with these societies and to cooperate with them in order to share their scientific resources.
- Within our organization, CHEMRAWN (CHEMical Research Applied to World Needs) and COCI (Committee on Chemistry and Industry) are perhaps best suited to help meet social needs. At the same time, divisions also are encouraged to create projects to meet social needs. It is my hope that CHEMRAWN and COCI will help the divisions with planning and assembling ideas and resources.

Increasing IUPAC Visibility

The importance of IUPAC activities ought to be recognized widely. To attain this goal we should focus on three specific target audiences: the "leading chemistry circles," the chemical communities in emerging regions, and the general public.

Leading chemistry circles: IUPAC has been, and will continue to be, concerned with the advancement of chemistry. Considering the rapid progress of science and technology, IUPAC must keep up with that swift pace in order to attract special attention from chemists. I think the standing committees and divisions are very much aware of this. It is my conviction that the activities of IUPAC should earn the respect of chemistry circles. We should seriously consider increasing the number of IUPAC sponsorships of the major international chemistry conferences, especially those on emerging areas of chemistry. It is also necessary to establish a mechanism to integrate advice from leading chemists.

Chemical communities in emerging regions: It is as important as ever that IUPAC assist chemical societies in rapidly developing countries. In recent years, many of these societies became Associate National Adhering Organizations (ANAOs) of IUPAC. In 2009, IUPAC consisted of 18 ANAOs in addition to 51 NAOs. Some of the ANAOs became full-members later, increasing the number of NAOs to 56 in 2011. However, I am concerned about a substantial drop in the number of ANAOs to a mere four, which means we lost nine societies in the last two years.

General public: One of the great achievements of IYC2011 has been to draw public attention to chemistry in a positive way. This trend must be carried over to the post-IYC2011 era for the sake of IUPAC's future. On the other hand, I had an opportunity to attend the closing ceremony of The Chemistry Olympiad 2010 in Tokyo, where I came across a feverish atmosphere of talented youth gathered from various countries. The media gave prominent coverage of this event, and conveyed very positive impressions of chemistry to the public. IUPAC has been involved in the Chemistry Olympiad in recent years, and I wish to establish even closer ties with its international organization.

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Communicating Chemistry



by Lida Schoen, Egbert Weisheit, and Keith Kelly

With the International Year of Chemistry¹ at the half-way mark, thousands of activities are either under way or planned that will engage the world with chemistry. This article looks at the implications of global engagement for the chemistry community and makes practical suggestions for building an interface between chemistry and the general public, and in doing so suggests that chemistry suffers isolation from the global community.

The article is divided into three sections, the first of which suggests a framework for visualizing perspectives on chemistry as a means of connecting these different perspectives, Section 2 describes the current state of chemistry teacher training and invites an approach to teacher education based on the communication of chemistry as opposed to the transfer of facts. Section 3 proposes a model for public interaction with chemistry. The conclusions suggest that it is the interface mechanisms between those outside chemistry and those inside chemistry that will effect public perceptions about chemistry.

Visualizing Chemistry Communication

We have two communities. There are those who belong to the *Chemistry Community*, who we will call Insiders (I). Those who do not belong to the *Chemistry Community* we will call Outsiders (O). An individual from either of these communities has a specific perspective on what chemistry is, how important it is, and

its relevance to their life and work. They may have strong ideas

about what actually constitutes “good” chemistry and what does not. It is precisely the isolation of these two communities that can contribute to alienating people from communicating with chemistry as a “culture.” We argue that what we need is a mechanism for creating an interface between these two isolated communities. In order to explore this idea further, consider the diagram below.

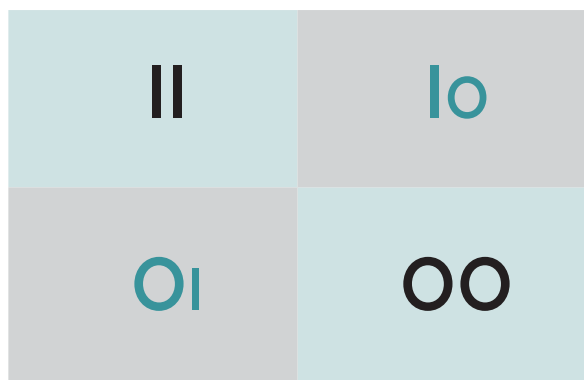
In this matrix, we can see how our two communities might interact with each other. In quadrant one (II), insiders of the chemistry community tend to have a perspective on chemistry which is dominated by the chemistry community to which they belong. In quadrant two (Io), we can see that chemistry insiders have a small understanding of the chemistry perspective of chemistry outsiders. Quadrant three (O_I) suggests that chemistry outsiders have only a small understanding of the perspective on chemistry shared by insiders of the chemistry community, and in quadrant four (OO) we can see that outsiders of the chemistry community tend only to see chemistry as an outsider of chemistry.

This is clearly a crude analogy for interaction between those who work in and with chemistry and those who do not. Nevertheless, what this framework gives us is a starting point from which to begin to build instruments for interaction between the two communities so as to raise awareness of the multiple chemistry perspectives that exist. Doing so will facilitate making decisions about how to involve outsiders more in the chemistry community.

The following two sections in this article present two perspectives on chemistry and describe interfaces which a) respect and engage with different perspectives on chemistry and b) raise awareness of perspectives on chemistry, both with a view to making the communication of chemistry more effective for all involved.

Communicating Chemistry through Teacher Training

Trainee teachers are one of the most important target groups that can help communicate chemistry to the wider world. A significant aspect of this communication is related to the multiple dimensions of language in the classroom as we read in *CI* recently.² In most countries, student teachers are trained in one subject



Insider-outsider perspectives on chemistry.

Communicating Chemistry

plus methodology. Another significant group of colleagues move into teaching from industry, where they may have been a scientist or engineer. In some countries, as in Germany, students cover two subjects plus methodology.

Based upon experiences in teaching and teacher training in Germany,³ it seems that many trainee teachers, not just the scientists and engineers, are not familiar with the multiple aspects of language—we tend to focus on content, on facts. But we know from a whole range of national and international studies (TIMSS, PISA, DESY) that learning of competencies and content are both important. Language is the most important competence for accessing all the information around us and

for constructing our world. It is intercultural awareness that enables us to place our learning within our known, home context, and step out of this domain to see our world from another's perspective. Teachers who must learn two subjects are faced with the demands and the standards of a third subject: language.

While it is true that learning chemistry means learning a language specific to the field, we also use language to engage students with chemistry and we assume that students have learned this language in other subjects. We mostly ignore that we have to start teaching and moderating the learning process by diagnosing students' "linguistic competence" and that the grammar and lexis of chemistry needs training and time.

In science teaching and teacher training, the subject-specific language of chemistry (names, equations, different types of formulae) is an important skill to teach to trainees. Based on what we call "basic concepts" and real-life contextualization, students show their competence (acid-base relations, redox reactions, substance, molecular structure, energetics) and partner groups moderated by the teacher trainer "awaken" the bits of language and develop "subject-specific" language. "Pictures" are described and rearranged, formulae are deconstructed and

reconstructed, and text is written in formulae, equations, and models.

The next stage is to motivate teachers to move forward in small steps of understanding and overcome the temptation to focus only on the content. There should be initiatives to generate self-diagnosis and to find specific tutoring to help teachers in learning

and using subject-specific language to teach chemical content in real-life contexts. Today, the training of chemistry teachers should focus on the interface between the subject and the learners more than just on the content itself. Meanwhile, we are still working in a world of chemistry with few approaches, resources, and activities that focus on bridging the gap between "so much

content" in chemistry and the focus on "basic concepts" and competencies. Content and language-integrated learning⁴ help bridge this gap by default because of the methodology involved.

Communicating Chemistry to the Public

Teachers and students can be chemistry's best ambassadors. All that is needed are suitable resources with exciting content and the means to show this content to the public. The Young Ambassadors for Chemistry⁵ project of IUPAC's Committee for Chemistry Education (begun in 2003 and ongoing) has perfected the art of popularizing chemistry among the general public. Everyday chemistry products are immediately relevant to the general public, so they can be a rich source of content and a focus for chemistry popularization events.

Simply putting chemicals together to compose a product is an ideal approach. By doing so, the public gains insight into compositions, which is easier and more illustrative than analyzing products. Examples of such activities include building the world's longest DNA molecule from local sweets (world record 12m in South Africa) or designing, producing, and marketing



Students in Korea participate in a Young Ambassadors for Chemistry event.

Communicating Chemistry

an innovative cosmetics line. In the 11 countries the Young Ambassadors for Chemistry team has visited, the underlying theories are taken from national curriculum guidelines (polymers, emulsions, detergents, electrolytes). For the teachers, the teams provided innovative, new raw materials like emulsifiers that allow emulsion production without heating.

These public events involve not only chemistry but also language, art, geography, history, and citizenship. In fact, teachers of many different subjects are introduced to the world of chemistry at such events. Non-chemistry teachers can be great ambassadors too.

Once teachers become familiar with methods of popularizing chemistry, they can ask their students to communicate with the public themselves. To do so, the students need two main ingredients: location and interface. An inviting, busy public place enables ambassadors to demonstrate procedures and products and present results.

One of the best ways to get these events noticed is by making lots of “noise” (e.g., by having local and national VIPs attend). In Cyprus,⁶ a local mayor promoted chemistry on the Square of Freedom, which was broadcast by a national TV station.⁷ Other ingredients for success include gauging public opinion with questionnaires and marketing activities such as students presenting products through “TV ads” or taking home the products they created.

Conclusions

Chemistry *Insiders* and *Outsiders* constitute two communities in isolation, and it is clear that effectively engaging young chemists and encouraging them to explain what they are doing can develop communication between the two communities. Helping student teachers to focus on specific chemistry language demands and learn how to design chemistry projects that focus on communication also create an interface between chemistry outsiders and insiders. The outcomes from the evaluation instruments for the YAC project⁸ and post-project events show a number of factors that highlight the usefulness and effectiveness of interface instruments in public chemistry events. Teachers value YAC courses and events and are interested in learning more about the role of chemistry in their lives.

The evaluation report⁸ also highlights that “Students feel that YAC activities help them understand the connection between chemistry and their daily lives.”

According to data from questionnaires, the public considers YAC events to be an appealing and novel approach to helping students understand chemistry. This finding supports the idea that more YAC workshops and events are needed to promote public understanding of chemistry.

Teachers in classrooms can serve as ambassadors for chemistry by developing interface instruments, namely tasks designed specifically to promote communication rather than just the transfer of facts. Teachers and students can serve as ambassadors in public events to help the public better understand chemistry. With this in mind, teachers might need to be explicitly guided on designing projects for classroom chemistry communication and also on how to help their students be young ambassadors for chemistry during public science-awareness-raising events. 🌐



A Young Ambassadors for Chemistry event in the Philippines.

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Distance Learning in Green Chemistry

by *Supawan Tantayanon, Kenneth M. Doxsee, Duangamol Nuntasri, and John C. (Jack) Niedbala*

A Distance Education Program in Green Chemistry has been developed through the collaborative efforts of the University of Oregon, Chulalongkorn University, the Thai Distance Learning Foundation, and the Chemical Society of Thailand. This program takes advantage of live internet and satellite-based video-conference technologies as well as web-based resources, bringing instructional materials to teachers at every high school in Thailand. In preparing and producing this program, its creators learned numerous scientific and cultural lessons.

In 1996, in commemoration of the 50th anniversary of His Majesty King Bhumibol Adulyadej's accession to the throne, the Thai Distance Learning Foundation was established with the goal of providing education to every child in the country, including those in remote areas where teachers and resources are scarce.¹ The Distance Learning Foundation brings live lessons from Wang Klaikangwon School in Hua Hin to schools throughout Thailand through distance learning equipment, installed without charge by the Royal Thai Army, and toll-free telephone lines, provided by the Telephone Organization of Thailand. Twelve channels carry live broadcasts directed to grades 1-12 at some 13000 schools throughout Thailand. An additional three channels carry vocational, language training, international documentaries, and technical college educational content. Live broadcasts are also provided asynchronously via satellite, conventional, and internet broadcasts throughout Southeast Asia, reaching Myanmar (Burma), Laos, Cambodia, Vietnam, Malaysia, and southern China.¹

The U.S.-Thai Distance Learning Organization, a nonprofit organization based in Eugene, Oregon, serves as the official U.S. affiliate of the Distance Learning Foundation. With the mission of fostering cultural and economic cooperation and facilitating the exchange of information and learning between Thailand and U.S. educational organizations and leaders, the Distance Learning Organization acts as a liaison between the Distance Learning Foundation, the Thai Grand Chamberlain, the Thai Consulate (in Los Angeles, California), the Thai Embassy (in Washington, D.C.), and U.S. collaborators.

During an official state visit in July 2006 to the University of Oregon by Her Royal Highness Princess Bajrakitiyabha Mahidol, a new distance learning program was announced. A collaboration between the University of Oregon, the Distance Learning Organization, and Distance Learning Foundation, the program utilizes green chemistry as a tool for the introduction of essential chemistry fundamentals. An introductory lesson for the Green Chemistry Program was presented at this time, carried via live satellite links to television channels throughout Thailand and neighboring countries, reaching a potential audience of around 60 million.

The Green Chemistry Program

The Green Chemistry Program used new approaches to teaching the fundamentals of chemistry, emphasizing the importance of small, group discussions and the benefits of peer-led team learning and guided inquiry. Green chemistry is particularly helpful for introducing new pedagogies because it introduces new ways of thinking about chemical concepts within the context of "real life" issues. This connection furthers one of the central tenets of the Distance Learning Foundation, His Majesty the King's educational policy of *อบรมบ่มนิสัย* ("ob rom bom nisai"): the teaching and training of a child to be good, honest, and economically sufficient. In addition, given its intrinsic safety, green chemistry allows the introduction (or reintroduction) of experiments and demonstrations in settings for which safety and cost issues prohibit traditional chemical experimentation, allowing science to "come to life" in the lab.

In February 2007, a second green chemistry lesson was presented by Kenneth Doxsee and Julie



Supawan Tantayanon leads a small-scale organic chemistry workshop, Bangkok, 2007.

Haack, followed by a laboratory workshop conducted by Supawan Tantayanon. The presentation focused on teaching methodologies for general chemistry and the 12 principles of green chemistry.² In the workshop, Tantayanon used the Small-Lab Kit³ she designed to illustrate several principles of green chemistry, including the prevention of waste, energy efficiency, and minimization of the potential for accidents. During this lesson, teachers were surveyed regarding issues of particular interest, importance, and/or relevance to their students and teaching environments. Virtually all of the participants identified the connection to real-life issues and the ability to carry out experimentation safely, with available materials, and at low cost, as key issues.

Building from this session and the information gained through the survey, a third green chemistry lesson was presented in December 2007, timed to coincide as closely as possible with the 80th birthday celebration for King Bhumibol Adulyadej in recognition of his strong commitment to education. In this lesson, an experiment from a typical laboratory manual was used as a platform for discussion of how one could determine if a chemical reaction was “good” or “bad.” The key message of this lesson was that, by systematically working through various ways of thinking about this issue, students may be led to ask questions that address the fundamentals of chemistry. Rather than being told that sometimes abstruse concepts such as balancing chemical equations, stoichiometry, and the mole are important, students can find themselves *asking* to be taught these concepts.

Through these initial explorations of the concepts of green chemistry, we learned several important lessons regarding geographic, language, and cultural barriers to the utilization of distance learning technology, beginning with the very concept of “green chemistry” itself. While modern web-based resources have made it easy to translate words and phrases into other languages, these resources, in general, do not take into account cultural nuances or interpretations. For example, one can easily be led by web translation services to conclude that *ลา* (la) is the

proper way to say “goodbye” when parting company. It may indeed be correct, but only if one will never see the person again; it is more likely that one would

prefer to say *สวัสดี* (“sawat-dee”). Initial translation of “green chemistry” into Thai proved entirely inappropriate, representing at best a baffling juxtaposition of the science of chemistry and the color green, which does not, in the Thai language, convey any sense of environmentalism, safety, or any nuance other than the simple color. (Interestingly, issues with the term “green” arise

in other contexts as well—e.g., the adjective “green” conveys a rather more extreme sense of environmentalism in Europe than in the United States.)

After numerous discussions about Thai terms that could convey the desired nuance, such as “clean chemistry,” “safe chemistry,” or “sustainable chemistry,” in the end, the solution was simple. When translating from English to Thai, the program developers simply left the words “green chemistry” in English, providing an instant “call-out” and eliciting in the listeners the response, “Oh, there are those English words that mean we are talking about chemistry that is safe for health and the environment.” Perhaps the common use in the United States of the Russian term “glasnost” rather than the comparatively nuance-free translation “openness” during the Gorbachev era is a similar example of an instance where “non-translation” represents the best way of effecting a translation.

The desire to engage students in the learning process through active discussion and questioning represented a second cultural barrier because Thai students, in general, believe it is disrespectful to ask questions of a teacher. Two approaches helped to overcome this obstacle. Simplest and perhaps most effective was the awarding of small prizes (e.g., University of Oregon



Thai teachers performing a green chemistry experiment, Bangkok, 2010.

Rather than being told that sometimes abstruse concepts . . . are important, students can find themselves asking to be taught these concepts.

Distance Learning in Green Chemistry

lapel pins) to participants who asked questions. Also effective was a brief but frank discussion of this cross-cultural issue, in which we noted that in the United States it can be considered disrespectful—a sign of lack of attention or engagement—*not* to ask questions of a speaker! In the end, the ability to formulate questions succinctly and clearly, and *simply to ask them*, may be one of the most valuable lessons the program imparts. Perhaps these students—the ones who ask questions instead of simply writing down what they are told—will be the ones to solve the problems facing our world today.



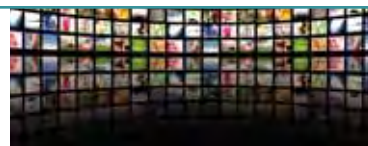
Workshop participants receive completion certificates in Bangkok, 2010.

With this background, we turned our attention to creating new age-appropriate laboratory materials. Meetings with Thai teachers suggested that Thai and U.S. expectations for high school chemistry course content were similar. In preparing materials for the workshops, we chose to focus on experiments with direct relevance to environmental issues, noting that while this does not *per se* represent an essential feature of green chemistry, maintaining a more concrete connection to intuitively relevant material seemed wise for the high school grade levels. Experiments were developed in collaboration with Dr. Jorge Ibañez and his colleagues in the Mexican Institute for Microscale and Green Chemistry at the Universidad Iberoamericana in Mexico City, who had recently authored a definitive textbook and laboratory guide for environmental chemistry.⁴ Selected experiments from this text, complemented by others adapted from the literature and/or developed collaboratively by Drs. Ibañez and Doxsee, were evaluated for their relevance to teaching relevant chemical topics, their illustration of multiple green chemical principles, and their reliability and reproducibility in the hands of inexperienced students. Final experiments were selected with consideration of the availability of the required materials in Thailand.

With experimental materials in hand, a series of six 2.5-hour workshops was scheduled at the rate of roughly one every two weeks from January through March 2010. Two-way audio and video via IP videoconferencing brought live coverage of presentations made in the University of Oregon's Media Services Center to two primary sites in Thailand: Bangkok and Hua Hin. Participants at these two sites, who were visible to the Oregon presenters through live video, interacted with the presenters, asking and answering questions and discussing content. One-way audio and video was brought through internet protocols to local and regional sites serving about 3000 Thai high schools. During the lessons, live translation was complemented by extended explanations in Thai, helping to bridge cultural differences between Thailand and the United States and ensuring real understanding of the curricular materials and of green chemistry in general.

As each experimental session began, issues of chemical safety were discussed. In practice, this proved to be a particularly important and relevant part of the program, though *not* for the most obvious reasons. The experimental procedures, designed to highlight green chemical concepts, were for the most part risk free. (Indeed, they were demonstrated from the confines of an unventilated video production booth.) Rather than dogmatically insisting on protective gear even when it was not necessary (e.g., when constructing a battery from aluminum foil, salt water, paper toweling, and charcoal)⁵ the instructors honestly appraised each situation and recommended *appropriate* safety precautions. In so doing, we avoided contributing to the “chemophobia” that is instilled by insisting that all chemical experimentation is dangerous and simultaneously highlighted a central lesson of green chemistry regarding the *assessment* rather than assumption of risk. Through this thoughtfulness, we were able to engage participants in the proper use of protective gear in those few cases where it was indeed called for.

Despite some trepidation about supervision of active laboratory experimentation from some 12000 kilometers away, the two-way video link and effective use of mobile cameras at the Thailand sites provided an experience for the instructor and students that was remarkably similar to onsite supervision. With literally “over-the-shoulder” views of experiments in progress and face-to-face conversations with participants, real-time corrections and suggestions occurred as readily as if all were present in the same laboratory. When difficulties were experienced in preparing a battery from



copper and aluminum coins,⁶ for example, the instructors noted that an inadvertent short circuit had been formed, a problem that was quickly remedied.

Not surprisingly, things did not always proceed as planned. These occasions were viewed as opportunities for discussion and engagement with the participants about possible reasons for deviations from expectations. In the midst of one discussion about the apparent failure of a photocell preparation,⁷ the lights suddenly went out at the Hua Hin site. After some frantic maneuvering by the technical staff, the Hua Hin site reappeared, with smiling participants rejoicing about the success of their photocell—they had realized that the photocurrent created when they illuminated their photocell with a light bulb had been masked by the fluorescent lights of the classroom, so they simply turned off those lights, dropping from on-line visibility but allowing the successful measurement of a very respectable photocurrent. More than simply an amusing anecdote, this event highlights an additional great power of green chemical experimentation: when the materials are intrinsically safe, curiosity-driven independent investigation is both tolerable and safe.

Following the conclusion of each experiment, interesting observations were discussed and relevant data analyses were carried out, often using participant-generated data, helping to ensure that the teacher participants were armed with the necessary information and background to transition the experiment to their own teaching. Finally, each experiment culminated in a discussion of the green principles viewed as relevant to the experiment. This discussion proved particularly valuable to both the participants—who were able to contribute intellectually to the workshops—and to the instructors, who were able to assess the extent of participant engagement in the workshops.

Outcomes

While the complexity of the project, involving numerous partners both in Thailand and the USA, led to occasional delays, the green chemistry workshop series was successfully presented from January through March 2010. The project culminated in the awarding of certificates to participants at the Bangkok and Hua Hin sites.

Prior to the final workshop, one of the teacher participants, Mr. Surapong Namnai, an instructor at the Wang Klaikungwon School, taught a special class session focused on one of the experiments, carried live to Ratchaprachanukrao 21 School in Mae Hong Sorn Province in the Northern part of Thailand. This represented the first step in transmitting information

from the workshops to the next generation of Thai science students.

As our understanding of the cultural similarities and differences between the two countries has continued to grow, we anticipate the development and presentation of additional green chemistry lessons, as well as inauguration of a complementary physics and mathematics program. In the longer term, it is hoped

that these programs will lead not only to the successful training of Thai teachers and their students, but to the continued development of scientific, educational, and personal connections between the countries and the many individuals, institutions, and organizations responsible for them. 🌐



Instructor Surapong Namnai of the Wang Klaikangwon School teaching his chemistry class in Hua Hin and, via two-way video communication, a class in Mae Hong Sorn Province in the Northern part of Thailand.

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Distance Learning in Green Chemistry

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This paper is based on a lecture presented at the 3rd International IUPAC Conference on Green Chemistry (ICGC-3), Ottawa, Canada, 15–18 August 2010. Other papers presented at ICGC-3 are in press and will appear in the IUPAC journal *Pure and Applied Chemistry*.

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See also www.iupac.org/publications/ci/indexes/stamps.html

Stamps International

A Day to Remember

Every two years, chemists from around the world congregate for a weeklong celebration of teaching, a fresh look at the latest research in the field, and the joy of being in a unique venue for international networking and communication. The 43rd IUPAC World Chemistry Congress, well positioned to underscore the value of "Chemistry Bridging Innovation Among the Americas and the World" in the International Year of Chemistry, will be held in San Juan, Puerto Rico, from 31 July to 5 August 2011.

As the Congress theme suggests, innovation and creativity drive change.

Thus, this note is a tribute to the ubiquitous polypropylene stacking chair and its creator, Robin Day, often touted as the most influential British furniture designer

of the 20th century, who died last November at the age of 95.

The stamp illustrated herein is part of a colorful set of 10 stamps issued by the United Kingdom's Royal Mail on 13 January 2009 to celebrate British design classics, which also include the Concorde, the Mini, and the Anglepoise lamp. The original chair designed by Day in 1962 was injection molded from polypropylene, the versatile thermoplastic polymer that had been developed only a few years earlier by the Italian chemist and Nobel laureate Giulio Natta (1954). It quickly became a staple at public seating places, from airports and sport arenas to restaurants and hospital waiting rooms, due to its simple yet comfortable design and its low cost and durability. Almost 50 years after the introduction of the polypropylene chair, it is worth remembering how a spark of creative genius may have a long-lasting effect on the goods that we all use and abuse, and sometimes even take for granted.

Written by Daniel Rabinovich <drabinov@uncc.edu>.



Establishing a Vital Tradition

The Series of International Congresses of Applied Chemistry, 1894-1912

by D. Thorburn Burns and H. Deelstra

The first in the series of international congresses of chemistry was held 3-5 September 1860 in Karlsruhe, Germany. This conference—called to discuss chemical nomenclature, notation, and atomic weights—was the idea of August Kekulé (1829-1896) and came to reality with the assistance of Adolphe Wurtz (1817-1884) and Carl Weltzien (1813-1870).*

After the Karlsruhe meeting, the international conventions of chemists were associated with the discussions of exhibits at the various International Expositions at Paris (1867, 1878, and 1889), Moscow (1872), Vienna (1873), Philadelphia (1876), Düsseldorf (1880), Milan (1881) and Chicago (1893). They had no formal organization relating one to the other or in sequencing.

The Paris Congress of 1889 was opened by Marcelin Berthelot (1827-1907) whose stated concept that “Theories are not to be considered, but only practical questions, such as those related to analytical methods and nomenclature . . .” carried over to the 1893 congress held in conjunction with the World’s Columbian Exposition in Chicago. At this congress, the chairman, Harvey Washington Wiley (1844-1930) suggested the establishment of a triennial international congress of chemistry. The American Chemical Society, which had met at the congress, set up a committee to consider “the expediency of holding similar con-

gresses at regular recurrent intervals of time,” and, subsequently, issued a letter of invitation in 1894 to foreign chemical societies to appoint similar committees.¹ However, prior to the drafting of the ACS letter, this concept was independently conceived by and acted upon by the Association of Belgian Chemists, which in 1891 proposed an international congress for 1893; however, the meeting was postponed until 1894.²⁻⁴

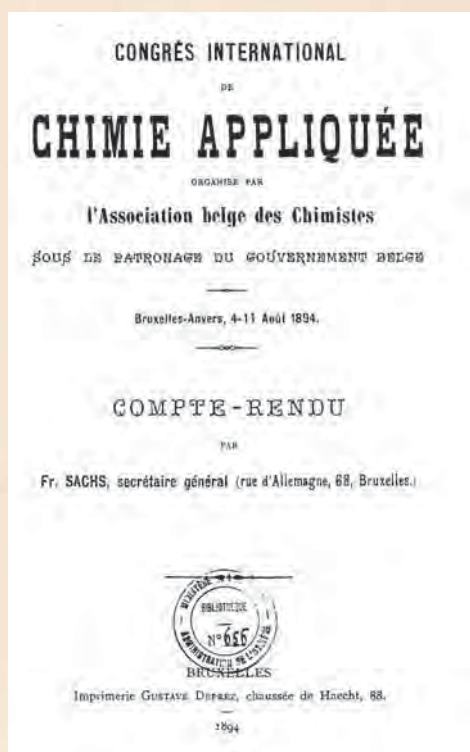
Thus, the International Congresses of Applied Chemistry did not, as previously suggested by George Sarton (1884-1956) in his *Guide to the History of Science* (1952)⁵ succeed the International Chemical Congresses, but developed from the community need. The Applied Chemistry Congresses had a considerable influence on the rates and degrees of professionalization of chemists in the various host countries. The two types of congresses continued their independent and separate ways, as exemplified by Paris acting as

host for the two types of congresses in 1900: the Congrès International de Chimie Pure, organized in conjunction with the Universal Exhibition, was not well supported, while the Congrès International de Chimie Appliquée was more successful and generated much published material.

The First International Congress on Applied Chemistry, held 4-11 August 1894 in Brussels and Antwerp, was organized by the Association of Belgian Chemists. This important initiative was undertaken by a very young association, having been founded in 1887.

Edouard Hanuise (1842-1913),⁶ the first president of the association, announced at the General Assembly on 29 April 1891 that the board of management had discussed the possibility of organizing an International Congress in Brussels. The idea had been put

forth by François Sachs (1849-1919),⁷ the association secretary, and Hanuise, both of whom were members of the sugar section and had good relations with sugar chemists in the European sugar-producing countries.



Title page of the Proceedings of the First International Congress of Applied Chemistry.

* A recent feature on the “First International Gathering of Chemists in Karlsruhe,” was published in the Nov-Dec 2010 *CI*, pp. 10-14.

Establishing a Vital Tradition

Sachs got the idea at the annual conference of the Austrian-Hungarian sugar chemists in 1890 when their chairman, Friedrich Strohmer (director of the Experimental Station for the Beet-Sugar Industry, Vienna) said it would be useful to organize an international meeting for all sugar chemists to unify the analytical methods used in the industry. At first, Hanuise and Sachs thought to restrict the scope of the proposed conference in Brussels to sugar and agricultural chemistry. However, D. Van Bastelaer (1823-1907), chairman of the food section, opposed this idea and convinced the association that the conference should be organized by the association alone, and should contain four sections, namely sugar, agricultural, food, and biological chemistry.

Sachs was the main driving force in the organization of this first congress. He came to an agreement with the French Sugar Association that the first congress should be in Brussels in 1892 and the second in Paris. He then encouraged all members of the association's four sections to prepare for the event. Because time was short, the Congress was postponed until 1893. On 29 August 1892, the first circular of the Congrès International des Chimistes to be held in April 1893 was sent out, together with an attachment of 29 topics.

Finally, the conference was held in 1894 in Brussels and Antwerp, because that year an International Exhibition was in Antwerp. Due to the International Exhibition it was easier to attract subsidies and convince chemists from abroad to assist as well as to attend. The title became Congrès International de Chimie Appliquée and was confined to chemical aspects of sugar refining, agricultural chemistry, foodstuffs, and biological chemistry. For most of the topics, position papers were prepared. The conference proved to be very successful, attracting 397 participants from 27 countries. At the closing session, the conclusions of all the questions considered were discussed. Most of the resolutions were accepted, with some partially accepted and adjourned to the next conference (e.g., control of food falsification, the effects of discharge of treated and untreated water into rivers). For some questions, international committees were set up to prepare reports for the next congress (e.g., calibration of chemical instruments, assimilation of phosphates by plants in different types of soil). Finally, it was decided

that the second congress on applied chemistry would be held in 1896 in Paris.

The Second International Congress on Applied Chemistry was organized by the Association of Chemists of the Sugar and Distillery Industries of France and the Colonies and held in Paris, 27 July to 8 August 1896. Léon Lindet (1857-1927) was chairman and François Dupont (1841-1911) secretary general of the organizing committee. Both were members of the French Sugar Association. The conference was placed under the patronage of the French government and chaired by Pierre Eugène Marcellin Berthelot (1823-1907), the permanent secretary of the French Academy of Sciences and honorary chairman of the Sorbonne.

The main aims of the congress were to unify analytical methods, produce an agreement to stop the falsification of foods and agree upon procedures for dealing with waste waters from cities and industries.

The areas of applied chemistry were at first extended to nine sections. In addition to the four in the first conference, sections were added on calibration of precision instruments, chemical industries, photography, electrochemistry, mining, and metallurgical industries. Just before the start of the congress, an eleventh section was added on waste-water treatment. This second congress attracted 1500 participants. The 500 or so questions introduced were discussed in the 60 sessions.

The opening address by M. Berthelot was noteworthy; first he made it clear that the congress was focussed on applied chemistry. He said, "You, [messieurs] gentlemen, you are the specialists in the applied chemistry." He stressed, however, that "pure chemistry is an essential base for applied chemistry" and went on to say "in chemistry, theory and practice are bound to each other by indissoluble ties."

The proceedings of the congress made up five volumes, each of about 500 pages. The agreed resolutions are clear links to the first conference at which several international committees were created to prepare reports on clearly specified topics in order to continue or to finalize the debates at the next conference. In the analytical section, specific committees were established in order to make proposals on the calibration of different instruments (e.g., "the saccharimetric scale").

François Sachs was the main driving force in the organization of this first congress.

The Series of International Congresses of Applied Chemistry

The **third congress** was held in Vienna, 28 July to 2 August 1898. The secretary general of the organizing committee was F. Strohmer. The congress was divided into 10 sections, with a new section on the teaching of applied chemistry and professional affairs. The aims of the congress were as before: discussions of important problems in applied chemistry, unification of methods of analysis, and the teaching of applied chemistry. For this meeting, all the chemical laboratories in Vienna were opened to delegates.

The **fourth congress** was held, once again, in Paris, from 23 to 31 July 1900. The congress was attended by more than 1800 delegates and the program was very similar to that of the 1896 meeting. During the congress, two important permanent commissions were established. The first was tasked with the realization of the resolutions agreed at each congress and was made up of the presidents of each congress. The second was to deal with analytical matters. This commission, under the presidency of Dr. G.F. Lunge (1839–1923) of Zurich, contained at least two experts from each country. Their task was to prepare documents about the conclusions from each congress and present the consensus views at the next congress.

The **fifth congress** was held in Berlin, 2–8 June 1903. In the invitation to attend it was made clear that the Berlin Congress would be organized just as the previous congresses. The number of attendees climbed to 2533 chemists from 38 different countries. About 500 papers were presented over 11 sections. An innovation was the introduction of plenary lectures.

The **sixth congress** was in Rome, 26 April to 3 May 1906. The invitation to attend noted that the first conference in this series was in Brussels in 1894 but incorrectly stated that it was at the initiative of the Belgian Association of Sugar Chemists. The conference was divided into 11 sections, 658 papers were presented and the total attendance was 2375. The excellent performance of the International Committee

on Analyses, established at the Paris Congress of 1900, is demonstrated by the lengthy report presented. The organization of this congress was very complex due to the structure of chemistry in Italy at the time; its success was a major step toward the professionalization of chemistry in Italy.

The **seventh congress** took place in London from 27 May to 2 June 1909. The attendance was 4100, 958 papers were presented in 11 sections and 6 subsections, and the proceedings ran to 18 volumes. As in 1906, the International Committee on Analyses produced its report for the congress. The report by the Explosives Section on The Rise and Progress of the British Explosives Industry presaged the times to come and the demise of the series.

Each congress became larger than the one before. The **eighth congress**, held in 1912 in Washington and New York, 4–13 September, attracted nearly 4500 participants with subjects for discussion divided into 23 sections. The proceedings filled 29 volumes. The next congress was planned for 1915 in St. Petersburg,

Russia, but World War I intervened. The extensive report by the International Committee on Analysis was again given by Lindet. In addition to the lectures and social program, an extensive tour of various industries was provided. The eighth congress was regarded at the time as a great success with “the most brilliant assemblage of men eminent in pure and applied chemistry ever brought together on this continent and a worthy successor of the preceding congresses.”

Despite the praise, after due reflection and discussions with friends, Bernard Conrad Hesse (1869–1934) gave a critique of the eighth congress and aspects of the seventh, with the aim of assisting the orga-



Edouard Hanuise (1842–1913), first president of the Association of Belgian Chemists.


The eighth congress, held in 1912 in Washington and New York, 4–13 September, attracted nearly 4500 participants . . .



On 6 March 1911, 18 months prior to the 8th Congress in Washington, D.C., *The New York Times* published this article, which undoubtedly helped spur interest in the event.

nizers of the ninth congress planned for 1915 in St. Petersburg. Interestingly, the Belgian Association of Chemists had expressed similar criticisms after the fourth congress in Paris, 1900.

The aftermath: As noted, the ninth congress, planned for 1915 in St. Petersburg did not take place. After the founding of IUPAC, the initiative for planning congresses became its responsibility. However, due to political and financial constraints, the International Congresses of Pure and Applied Chemistry did not commence until 1934. The loss of the International

Congresses of Applied Chemistry was noted in 1927 and IUPAC was criticized for its 15-year delay and lack of action “in bringing the chemists of the world together in a congress organized along democratic lines and devoted to science.” The spirit of the Congresses of Applied Chemistry re-emerged in the series of EUROANALYSIS Conferences, starting in 1972 at Heidelberg.⁸ The sixteenth in this series will be in Belgrade, 11-15 September 2011, in this the International Year of Chemistry. 

Note

The expanded and fully referenced version of this article is available at *Microchimica Acta* 2011, Volume 172, Numbers 3-4, Pages 277-283; doi: 10.1007/s00604-010-0465-3

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Discovery of the Elements with Atomic Numbers 114 and 116

Priority for the discovery of the elements with atomic numbers 114 and 116 has been assigned, in accordance with the agreed criteria, to collaborative work between scientists from the Joint Institute for Nuclear Research in Dubna, Russia, and from Lawrence Livermore, California, USA (the Dubna-Livermore collaborations). The discovery evidence was recently reviewed and recognized by an IUPAC/IUPAP Joint Working Party. IUPAC confirmed the recognition of the elements in a letter to the leaders of the collaboration.

The IUPAC/IUPAP Joint Working Party (JWP) on the priority of claims to the discovery of new elements has reviewed the relevant literature pertaining to several claims. In accordance with the criteria for the discovery of elements previously established by the 1992 IUPAC/IUPAP Transfermium Working Group, and reiterated by the 1999 and 2003 IUPAC/IUPAP JWPs, it was concluded that “the establishment of the identity of the isotope ^{283}Cn by a large number of decaying chains, originating from a variety of production pathways essentially triangulating its A, Z character enables that nuclide’s use in unequivocally recognizing higher- Z isotopes that are observed to decay through it.” From the 2004 Dubna-Livermore collaborations, the JWP notes: (i) the internal redundancy and extended decay chain sequence for identification

of $Z = 287114$ from $^{48}\text{Ca} + ^{242}\text{Pu}$ fusion (Oganessian et al. *Eur. Phys. J. A* **19**, 3 (2004) and *Phys. Rev. C* **70**, 064609 (2004)); and (ii) that the report of the production of 291116 from the fusion of ^{48}Ca with ^{245}Cm is supported by extended decay chains that include, again, ^{283}Cn and descendants (Oganessian et al. *Phys. Rev. C* **69**, 054607 (2004)). It recommends that the Dubna-Livermore collaborations be credited with discovery of these two new elements.

A synopsis of the relevant experiments and related efforts is presented in a technical report published online in *Pure and Applied Chemistry* on 1 June 2011.

With the priority for the discovery established, the scientists from the Dubna-Livermore collaborations are invited to propose a name for the two super-heavy elements: 114 and 116. The suggested names will then go through a review process before adoption by the IUPAC Council.

Reviews of the claims associated with elements 113, 115, and 118 are at this time not conclusive and evidence has not been met for the discovery criteria.



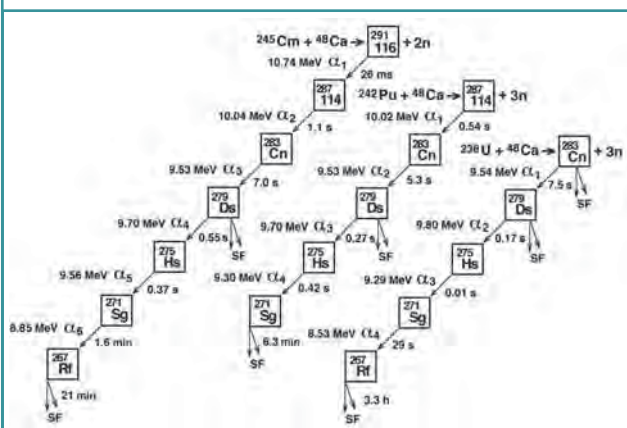
[doi:10.1351/PAC-REP-10-05-01](https://doi.org/10.1351/PAC-REP-10-05-01) or see IUPAC project 2006-046-1-200

IUPAC Announces Winners of the 2011 IUPAC Prizes for Young Chemists

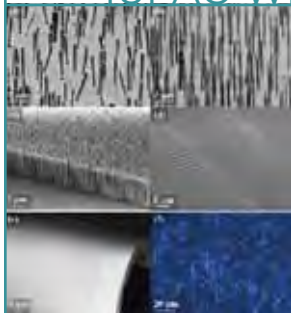
The winners of the 2011 IUPAC Prizes for Young Chemists, awarded for the best Ph.D. theses in the chemical sciences as described in 1000-word essays, are as follows:

- **Rubén Costa Riquelme**, University of Valencia, Valencia, Spain
- **William Donald**, University of California, Berkeley, California, USA
- **Matthew Macauley**, Simon Fraser University, Burnaby, British Columbia, Canada
- **Bozhi Tian**, Harvard University, Cambridge, Massachusetts, USA
- **Sheng Xu**, Georgia Institute of Technology, Atlanta, Georgia, USA
- **Chengqi Yi**, University of Chicago, Illinois, USA

The winners will each receive a cash prize of USD 1000 and travel expenses to the 43rd IUPAC Congress, 30 July–7 August 2011, in San Juan, Puerto Rico. Each prizewinner will also be invited to present



A summary of α -particle decay chains observed by Dubna and collaborations illustrating the matched characteristics of ^{283}Cn attained through three otherwise independent entrance bombardment plus α -decay combinations. See PAC [doi:10.1351/PAC-REP-10-05-01](https://doi.org/10.1351/PAC-REP-10-05-01).



Oxide Nanowire Arrays for Energy Sciences
(Sheng Xu).

a poster at the IUPAC Congress describing his award-winning work and to submit a short, critical review on aspects of his research topic to be published in *Pure and Applied Chemistry*. The awards will be presented to the winners of the 2010 and 2011 prizes during the Opening Ceremony of the Congress.

The essays describing the 2011 winners' theses, which may be found on the IUPAC website,

cover a wide range of subject matter:

- Dr. Costa Riquelme: *Theoretical and Experimental Study of Light-Emitting Electrochemical Cells Based on Ionic Transition-Metal Complexes: From the Molecule to the Device*
- Dr. Donald: *Ion Nanocalorimetry: Measuring Absolute Reduction Potentials and Investigating Effects of Water on Electron Solvation and Ion Fluorescence*
- Dr. Macauley: *Insight into O-GlcNAc Protein Modification Using Chemical and Biochemical Tools*
- Dr. Tian: *Design, Synthesis, and Characterization of Novel Nanowire Structures for Photovoltaics and Intracellular Probes*
- Dr. Xu: *Oxide Nanowire Arrays for Energy Sciences*
- Dr. Yi: *Probing the AlkB Family DNA/RNA Repair Enzymes with a Chemical Disulphide Cross-Linking Approach*

The Prize Selection Committee received 47 applications from 19 different countries. Chaired by IUPAC Past President Jung-Il Jin, the committee comprised members of the IUPAC Bureau with a wide range of expertise in chemistry. In view of the many high-quality applications, the committee gave three Honorable Mention Awards to these young chemists:

- **Changle Chen**, University of Chicago, Chicago, Illinois, USA
- **Lei Fang**, Northwestern University, Evanston, Illinois, USA
- **Bo Shen**, Vanderbilt University, Nashville, Tennessee, USA

Applications for the 2012 Prizes are now being solicited, as described on the IUPAC website.

 www.iupac.org/web/nt/2011-05-23_2011_winners

In Memoriam

IUPAC was saddened to learn of the following deaths (reported since 1 June 2009) of Union colleagues. We shall remember them with respect and gratitude for their service to IUPAC.

Prof. John R. de Laeter (Australia)—Commission on Isotopic Abundances and Atomic Weights: Member, 1987–1995, National Representative 1996–2001 and 2004–2009; Member, Subcommittee on Isotopic Abundance Measurements 2000–2010; Member, Subcommittee on Natural Assessment of Fundamental Understanding of Isotopes, 2010. (Died 19 August 2010)

Prof. Jerzy Haber (Poland)—Commission on Colloid and Surface Chemistry including Catalysis, National Representative, 1998–1999. (Died 1 January 2010)

Prof. Alfred Hartmann (Switzerland)—External Advisor to Finance Committee. (Died 19 May 2010)

Prof. Walter Heitz (Germany)—Macromolecular Division, Division President, 1989–1993; Member, Working Party on Polymer Liquids, 1989–1991.

Prof. Kazuyuki Horie (Japan)—Commission on Macromolecular Terminology, Associate Member, 1996–1997, Titular Member, 1998–2001; Macromolecular Division, Titular Member, 2002–2005; Member, Subcommittee on Polymer Terminology, 2002–2011. (Died 29 April 2011)

Prof. Arisztid Lajos Horváth (United Kingdom)—Subcommittee on Liquid Solubilities, Member, 2000–2001. (Died 4 February 2010)

Prof. Pan Ming Huang (Canada)—Commission on Fundamental Environmental Chemistry, Associate

Handy Pull-Out/See Centerfold

A Concise Summary of Quantities, Units, and Symbols in Physical Chemistry, prepared for publication by Jurgen Stohner and Martin Quack, IUPAC & RSC Publishing, Cambridge (2009); corrected version (2011).

This 4-page handy pull-out is based on the so-called IUPAC Green Book (see iupac.org/web/ins/110-2-81). A laminated version is available from the Royal Society of Chemistry at www.rsc.org/shop/books/2009/9781849730655.asp (set of 10 for £10)

Member, 1994–1999, Titular Member, 2000–2001; Member, Subcommittee on Biophysico-Chemical Processes in Environmental Systems, 2002–2009; Chemistry and Environment Division, Associate Member, 2002–2005, Titular Member, 2006–2009; Representative of IUPAC on International Union of Soil Sciences, 2004–2009. (Died 13 September 2009)

Prof. H. Roy Krause (Canada)—Commission on Isotopic Abundances and Atomic Weights, Associate Member, 1985–1989, Titular Member, 1989–1997; Member, Subcommittee on Natural Isotopic Fractionation, 2000–2001; IUPAC Fellow since 2002. (Died 2 March 2010)

Prof. Emilio Kyburz (Switzerland)—Medicinal Chemistry Section Committee, Associate Member, 1998–2001.

Prof. Joachim Meissner (Germany)—Subcommittee on Structure and Properties of Commercial Polymers, Member. (Died 7 January 2011)

Prof. Itaru Mita (Japan)—Member, Subcommittee on Polymer Terminology, 2004–2009. (Died 3 November 2009)

Prof. Gerard Daniel Rieck (Netherlands)—Commission on High Temperatures and Refractory Materials, Secretary, 1969–1979. (Died 11 May 2010)

Prof. Jack H. Stocker (USA)—Commission on Nomenclature of Organic Chemistry, Associate Member, 1991–1999. (Died 8 July 2009)

Prof. F. William Sunderman Jr. (USA)—Section on Clinical Chemistry, Member, 1971–1975, Commission on Toxicology, Chair, 1973–1977. (Died 1 April 2011)

Election of IUPAC Officers and Bureau Members

According to IUPAC statutes, Council must elect officers of the Union and elected members of the Bureau. Nominations for the various positions that fall vacant at the end of 2011 had to be received by the Secretary General at the IUPAC Secretariat before 3 June 2011 (i.e., two months before the start of the Council meeting).

On 1 January 2012, Kazuyuki Tatsumi (Japan), vice president and president elect, will become president. The vice president to be elected will be president elect on 1 January 2012 and will become president on 1 January 2014. Nicole Moreau (France), current president, will become past president and remain an officer and a member of the Bureau for a period of two years. Meanwhile, Jung-Il Jin (Korea), current past president, will retire. Secretary General David StC. Black (Australia) will also retire after completing a second and final four-year term. Treasurer John Corish (Ireland), who was elected for a four-year term 2008–2011, is eligible for a second four-year term commencing in 2012.

At its assembly in Puerto Rico, on 3–4 August 2011, the Council will be asked to elect a vice president, a secretary general, a treasurer, and members of the Bureau to fulfill the vacancies created by retiring members (see May–June 2011 *C/I* for details). This year, the candidates are as follows:

ELECTION BALLOT

Vice President

- Mark C. Cesa (USA)
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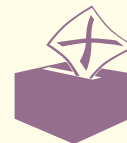
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- Natalia Tarasova (Russia)—reappointment



Details on the election of officers and Bureau members, including bios of the nominees, will be available online. To make your voice heard, contact your National Adhering Organization and get involved.

List of Keywords for Polymer Science Journals

The objective of this recently initiated project of the Polymer Division is to create a list of the most representative keywords that cover all aspects of polymer science (polymer chemistry, polymer physics, polymer technology, polymer properties), which will be presented to publishers and editors of polymer science journals as a recommended list of keywords.

Scientific literature searches are primarily conducted by way of computer database searches using keywords that are supplied by the authors. The selection of keywords that best describe the content of a publication is therefore very important. Some publishers of polymer science-related journals provide a recommended list of keywords from which authors may select the most relevant terms; other publishers do not. In the latter case authors are asked to provide a few keywords according to their best understanding of the content. Different authors may use different gradations of importance of the best terms describing the content of their publication, which may introduce some ambiguity and make the literature search less accurate. In addition, some terms describing newly discovered phenomena may be not included in an existing list of keywords.

The terms will be selected from:

- the available lists of keywords
- the most cited publications in polymer science within the last 10 years
- papers published in polymer journals with the highest impact factor
- published IUPAC terminology recommendations

Careful study has been conducted for more than two years on behalf of the Subcommittee on Polymer Terminology to establish the feasibility of such a project, and has concluded that the polymer field lends itself to such a venture and its success, which will result in a valuable tool for authors and publishers alike.

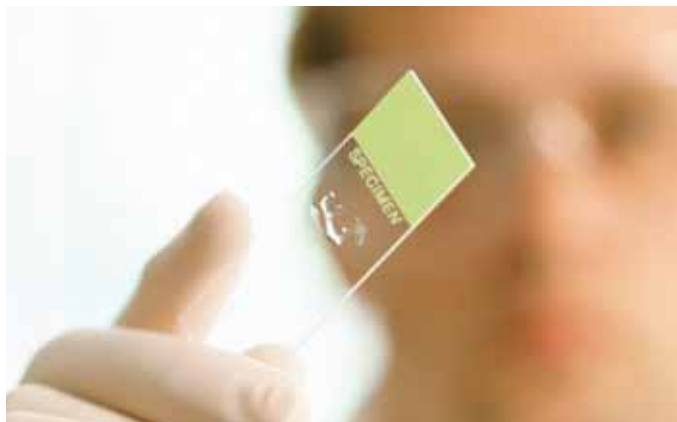
For more information, contact Task Group Chair Przemyslaw Kubisa <pkubisa@bilbo.cbmm.lodz.pl>.

 www.iupac.org/web/ins/2010-036-1-400

Advances in Immunochemistry and Applications to Human Health

The field of immunochemistry is becoming increasingly important in the development of diagnostic and therapeutic approaches to many different diseases. The objective of this project is to compile present knowledge of the molecular basis of immunochemical interactions, to summarize the rapidly expanding applications in many health-related areas, and to critically discuss future research needs.

The project builds on earlier work by the Chemistry and Human Health Division. A project on Immunochemistry of Metals (1999-047-1-700) has been completed, five publications* have dealt with the molecular mechanisms of immune sensitization caused by metals, and a critical evaluation of the use of clinical tests potentially available for diagnosing specific metal allergies. In addition, a project to develop a "Glossary of Terms in Immunotoxicology" (2007-053-1-700) is nearly completed.



The present project will further IUPAC's involvement in immunochemistry by describing advances in the understanding of chemical interactions between antigens and T-cell receptors (TCR) or immunoglobulins, and depicting how immunochemical applications improve and diversify medical diagnostics and therapeutics. The project will cover the following:

1. **Antibodies, antigens, and their interactions**
 - antibodies and TCR: Structure, hypervariable region, idiotype, paratope
 - antigens: macromolecules, haptens, metals, small molecules. Domains, epitope (linear, conformational), epitope mapping, epitope tag, specific motifs

—interactions of antigens with antibody/TCR: antigenic determinants, complementarity-determining region, mimitopes, functional epitopes, effects of chemical modifications

—technical production: Polyclonal and monoclonal antibodies

2. Application in Diagnostics

—antibody labeling, ELISA and Spot-ELISA in diagnostics

—immunocytochemistry and histochemistry in pathology

—immunoseparation and immunoelectrophoresis in biochemistry

—biosensor detection systems in toxicology (drugs, toxicants, environmentally persistent chemicals, agents of chemical warfare)

3. Application in Therapeutics

—principles of biosimilarity and new biological entity

—design and production of therapeutic antibodies and of cell-specific carriers

—applications to autoimmune-disease, tumors, allergies

—active/passive vaccination in cancer

4. Design and Prediction of Chemical Affinities

—affinities and specificities of TCRs and antibodies

—epitope recognition patterns, protein-epitope mimetics, antibody libraries, engineered antibodies and fragments

—in silico prediction and computational chemistry of interactions used for design of therapeutic antibodies and for hazard characterization

The project is designed to facilitate the advancement of research in the chemical sciences and to serve the current educational needs of chemists and other scientists in the cross-disciplinary areas of chemistry, immunology, and human health.

*PAC 76: 1255-1268 (2004), PAC 76: 1269-1281 (2004), PAC 78: 2155-2168 (2006), PAC 80: 1349-364 (2008), and PAC 81: 153-167 (2009).

For more information, contact Task Group Chair Michael Schwenk <mike.schwenk@gmx.net>.

 www.iupac.org/web/ins/2010-051-1-700

Update of “Glossary Terms Used in Computational Drug Design”

The aim of this project is to provide a useful glossary for medicinal chemists and computational chemists in industrial and academic research, as well as for teaching. It has been 14 years since the publication of “Glossary of Terms Used in Computational Drug Design” (*Pure Appl. Chem.*, Vol. 69, No.5, pp.1137-1152, 1997; doi:10.1351/pac199769051137). During this time the subject has undergone considerable change, particularly because the new high-throughput technologies and the genomics revolution have fueled a need for novel computational methods to handle the resulting data deluge. In addition, simple computational tools are now available for use by medicinal chemists. The glossary will provide intellectual support for conversations between laboratory and computational chemists and for the interpretation of calculations that a bench chemist or student might perform.



The glossary will include terms in common use in computational support of drug discovery. If needed, it will update the approximately 100 definitions in the 1997 report. In addition, the glossary will add hundreds of new terms that describe methods used in virtual screening, data mining, and cheminformatics. For example, there will be an entry for the IUPAC InChI textual definition of a molecular structure, for ROC curves that describe the simulated ability of a virtual screening method to retrieve actives from a database that includes many inactives, and for recursive partitioning that attempts to define the combination of molecular properties that distinguish active from inactive molecules. It is anticipated that the glossary will at least triple in size.

For more information, contact Task Group Chair Yvonne C. Martin <yvonnecmartin@comcast.net>.

 www.iupac.org/web/ins/2010-057-3-700

The Project Place

Glossary of Small Molecules of Biological Interest

The objective of this project, jointly coordinated with the IUBMB-IUPAC Joint Commission on Biochemical Nomenclature, is to deliver an authoritative source of accepted names, structures, numbering, and naming of derivatives of important biological molecules, for which it is currently difficult to find such information.

Metabolism depends on a range of particular molecules which act as enzyme substrates, prosthetic groups, and cosubstrates, or are involved in other biochemical processes. The quantitative study of these compounds in living systems represents the new field of Metabolomics.

Some of these compounds are derived from vitamins. At present, it is not easy to find nomenclature information about some of them, such as thiamine diphosphate, riboflavin, and coenzyme A. Some are not described in any IUPAC document. It is not obvious how the atoms are numbered, and how to name derivatives. There are many alternative names in the literature, leading to confusion. An IUPAC document that lists biochemical compounds was published in 1966. Some of them are now described in more comprehensive documents; many other compounds have subsequently been discovered. Information on most of them, and many more, may be found in databases such as PubChem and ChEBI, the Protein Databank, and Bioinformatics websites such as KEGG.

The aim of this project is to make a bridge between biochemical and chemical terminology, so that compounds can be identified more easily. The criteria for addition of compounds to the list will include frequency of use in the literature of biochemistry and molecular biology, and their importance in pharmacy and nutrition. Entries will include IUPAC name, accepted name, synonyms, biological function, molecular formula, graphical structure, INCHI, numbering, charge, mass, INN, CAS Registry Number, and links to the IUPAC/IUBMB enzyme list. This project will bring together representatives of the biochemical nomenclature committees of IUPAC and IUBMB, and of ChEBI, the Protein Databank, BRENDA enzyme database, and other online resources.

For more information, contact Task Group Chair Richard Cammack <richard.cammack@kcl.ac.uk>.

 www.iupac.org/web/ins/2009-022-2-800

Life-Cycle Assessment—Call for Partners

IUPAC should take the lead in defining and setting the rules for Life Cycle Assessment. [The Committee on Chemistry and Industry \(COCI\)](#) is calling for individuals interested in participating in such a project.

Life-cycle data is frequently used in discussions about sustainability, particularly when comparisons are made between the resources required for certain products or modes of transportation. One of the most-used data sets is the “CO₂ footprint.” Many companies and even consultancies have developed their own life-cycle assessment concepts, which can result in comparing apples with pears. However, several scientific, unbiased approaches to life-cycle assessments can be found in the literature.

IUPAC should help develop a common understanding about life-cycle assessments and a set of rules governing how to use the concept. COCI seeks partners to form a task group on life-cycle assessments. An initial discussion will take place during the General Assembly in Puerto Rico.

For more information, contact COCI Chair Michael Droscher <michael.droscher@evonik.com>.



Cradle to Cradle is one of the better-known lifecycle assessment systems.

The Periodic Table of the Isotopes: First Release

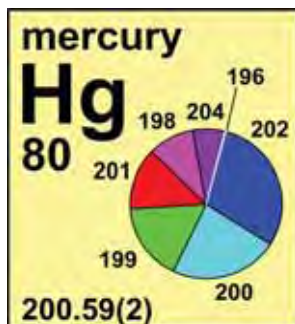
For almost 150 years, the Periodic Table of the Elements has served as a guide to the world of elements by highlighting similarities and differences in atomic structure and chemical properties. To introduce students, teachers, and society to the existence and importance of isotopes of the chemical elements, an IUPAC Periodic Table of the Isotopes (IPTI) has been prepared and can be found as a supplement to this issue (see supplement). Where the Periodic Table of the Elements indicates the similarities of the properties of chemical elements, the IPTI emphasizes the uniqueness of each element.

The IPTI supports IUPAC's leadership role in the 2011 International Year of Chemistry and is the first outcome of IUPAC project 2007-038-3-200 (Development

The Project Place

of an Isotopic Periodic Table for the Educational Community). A unique feature of this periodic table is that it shows the isotopic abundance of each stable isotope of an element in a pie diagram, revealing easily the number of stable isotopes (and their mass numbers) of each element. Color-coded-element cells on the IPTI distinguish between elements having no stable isotopes, one stable isotope, and two or more stable isotopes. The standard atomic weights of the 10 elements assigned as intervals in December 2010 by IUPAC are also clearly designated. The IPTI is also available from the website of the Commission on Isotopic Abundances and Atomic Weights <www.ciaaw.org>.

An interactive IPTI is in preparation and is being field tested by a select group of teachers and students. It illustrates many applications of stable and radioactive isotopes in research, as well as in daily life. A mouse-click on any chemical-element cell will display a short description of selected applications of stable and/or



radioactive isotopes, including figures and illustrations. In addition, a student's introduction, a teacher's guide, and a list of references are being developed.

Members of the project task group who contributed to this first release include N.E. Holden (Brookhaven National Laboratory), T.B. Coplen (U.S. Geological Survey), J.K. Böhlke (U.S. Geological Survey), M.E. Wieser (University of Calgary, Canada), G. Singleton (U.S. Department of Energy), T.R. Walczyk (National University of Singapore), S. Yoneda (National Museum of Nature and Science, Japan), P.G. Mahaffy (King's University College, Edmonton, Canada), and L.V. Tarbox (U.S. Geological Survey).

For more information, contact Task Group Chair N.E. Holden <holden@bnl.gov>. See insert/supplement.

 www.iupac.org/web/ins/2007-038-3-200

Provisional Recommendations

Provisional Recommendations are drafts of IUPAC recommendations on terminology, nomenclature, and symbols made widely available to allow interested parties to comment before the recommendations are finally revised and published in Pure and Applied Chemistry. Full text is available online.

Extension of ThermoML: The IUPAC Standard for Thermodynamic Data Communications

ThermoML is an XML-based approach for storage and exchange of experimental, predicted, and critically evaluated thermophysical and thermochemical property data. Extensions to the ThermoML schema for the representation of speciation, complex equilibria, and properties of biomaterials are described. The texts of fourteen data files illustrating the new extensions are provided as Supporting Information together with the complete text of the updated ThermoML schema.

Comments by 31 August 2011

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 http://media.iupac.org/reports/provisional/abstract11/frenkel_310811.html

Guidelines for Reporting of Phase Equilibrium Measurements

Recommendations are given for reporting in the primary scientific literature of measurements involving phase equilibrium. The focus is on documentation issues, and many of the recommendations may also be applied to the more general fields of thermodynamic and transport properties. The historical context of the work and specific plans for implementation of the recommendations are discussed.

Comments by 31 October 2011

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 http://media.iupac.org/reports/provisional/abstract11/chirico_311011.html

Glossary of Terms Used in Biomolecular Screening (IUPAC Recommendations 2011)

John Proudfoot, et al.

Pure and Applied Chemistry, 2011

Vol. 83, No. 5, pp. 1129–1158

Biomolecular screening is now a crucial component of the drug discovery process. This glossary will be of use to practitioners in the field of screening and to those who interact with the screening community. The glossary contains definitions related to various aspects of the screening process such as assay types, data handling, and relevant technologies. Many of the terms used in this discipline are not covered by existing glossaries, and where they are, the definitions are often not appropriate for this field. Where appropriate, the document provides new or modified definitions to better reflect the new context. The field of biomolecular screening is multidisciplinary in nature, and this glossary, containing authoritative definitions, will be useful not only for regular practitioners, but also for those who make use of data generated during the screening process.

 <http://dx.doi.org/10.1351/PAC-REC-09-05-03>

IUPAC-IUGS Common Definition and Convention on the Use of the Year as a Derived Unit of Time (IUPAC Recommendations 2011)

Norman E. Holden, et al.

Pure and Applied Chemistry, 2011

Vol. 83, No. 5, pp. 1159–1162

The units of time (both absolute time and duration) most practical to use when dealing with very long times (e.g., in nuclear chemistry and earth and planetary sciences) are multiples of the year, or annus (a). The definition of the year in terms of the SI base unit, is no trivial matter, as the year is not commensurable with the day, and is not a constant. In view, however, of the necessity to define units for time in such a way that they can be considered as constant for practical purposes, it is here recommended to define the year directly on the basis of the SI unit, the second. Taking into account the non-relativistic estimate of astronom-

ical decrease by 0.530 s per century, for the epoch 2000.0, $1 \text{ a} = 31556925.445 \text{ s}$. Adoption of this definition, and abandonment of the use of distinct units for time differences, will bring the earth and planetary sciences into compliance with quantity calculus for SI and non-SI units of time.

 <http://dx.doi.org/10.1351/PAC-REC-09-01-22>

Chemical Speciation of Environmentally Significant Metals with Inorganic Ligands. Part 4: The $\text{Cd}^{2+} + \text{OH}^-$, Cl^- , CO_3^{2-} , SO_4^{2-} , and PO_4^{3-} Systems (IUPAC Technical Report)

Kipton J. Powell, et al.

Pure and Applied Chemistry, 2011

Vol. 83, No. 5, pp. 1163–1214

The numerical modeling of Cd^{II} speciation amongst the environmental inorganic ligands Cl^- , OH^- , CO_3^{2-} , SO_4^{2-} , and PO_4^{3-} requires reliable values for the relevant stability (formation) constants. This paper compiles and provides a critical review of these constants and related thermodynamic data. It recommends values of $\log_{10} \beta_{p,q,r^\circ}$ valid at $I_m = 0 \text{ mol kg}^{-1}$ and 25°C (298.15 K), along with the equations and empirical reaction ion interaction coefficients, $\Delta\epsilon$, required to calculate $\log_{10} \beta_{p,q,r^\circ}$ values at higher ionic strengths using the Brønsted–Guggenheim–Scatchard specific ion interaction theory. Values for the corresponding reaction enthalpies, $\Delta_r H$, are reported where available. Unfortunately, with the exception of the Cd^{II} -chlorido system and (at low ionic strengths) the Cd^{II} -sulfato system, the equilibrium reactions for the title systems are relatively poorly characterized.

This review is the fourth in a series relevant to the speciation of heavy metal ions in environmental waters of low to moderate ionic strength. It identifies the best available equilibrium data for use in chemical speciation modeling of reactions of Cd^{2+} with the major inorganic ligands present in environmental systems: Cl^- , OH^- , CO_3^{2-} , SO_4^{2-} , and PO_4^{3-} . The previous reviews in this series were on the Hg^{2+} , Cu^{2+} , and Pb^{2+} complexation reactions with these ligands.

 <http://dx.doi.org/10.1351/PAC-REP-10-08-09>

Mechanisms of Chemical Generation of Volatile Hydrides for Trace Element Determination (IUPAC Technical Report)

Alessandro D'Ulivo, et al.

Pure and Applied Chemistry, 2011

Vol. 83, No. 6, pp. 1283-1340

Aqueous-phase chemical generation of volatile hydrides (CHG) by derivatization with borane complexes is one of the most powerful and widely employed methods for determination and speciation analysis of trace and ultratrace elements (viz. Ge, Sn, Pb, As, Sb, Bi, Se, Te, Hg, Cd, and, more recently, several transition and noble metals) when coupled with atomic and mass spectrometric detection techniques. Analytical CHG is still dominated by erroneous concepts, which have been disseminated and consolidated within the analytical scientific community over the course of many years. Thus, the overall approach to CHG has remained completely empirical, which hinders possibilities for further development. This report is focused on the rationalization and clarification of fundamental aspects related to CHG.

 <http://dx.doi.org/10.1351/PAC-REP-09-10-03>

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Volume 88: Esters with Water—Revised and Updated (4 part series)

- Part 1. C2 to C4 Esters
J. Phys. Chem. Ref. Data 38, 1093 (2009);
doi:10.1063/1.3243853
- Part 2. C5 and C6 Esters
J. Phys. Chem. Ref. Data 39, 013102 (2010);
doi:10.1063/1.3243973
- Part 3. C7 and C9 Esters
J. Phys. Chem. Ref. Data 39, 023102 (2010);
doi:10.1063/1.3339774
- Part 4. C10 and C32 Esters
J. Phys. Chem. Ref. Data 39, 033107 (2010);
doi:10.1063/1.3457361

Volume 89. Alkali Metal Nitrates.

- Part 1. Lithium Nitrate
J. Phys. Chem. Ref. Data 39, 033104 (2010);
doi:10.1063/1.3437029

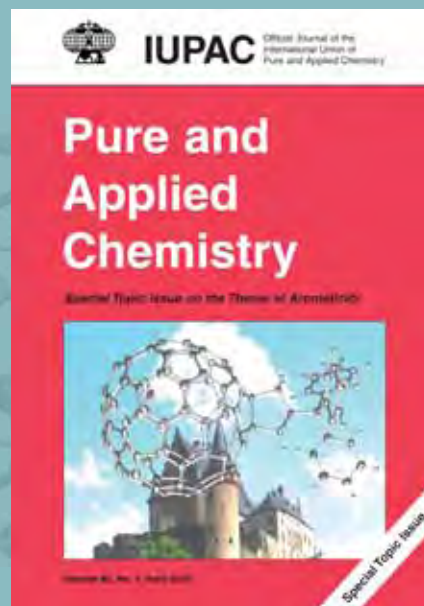
Volume 90. Hydroxybenzoic Acid Derivatives in Binary, Ternary, and Multicomponent Systems.

- Part I. Hydroxybenzoic Acids, Hydroxybenzoates, and Hydroxybenzoic Acid Salts in Water and Aqueous Systems.
J. Phys. Chem. Ref. Data 40, 013101 (2011);
doi:10.1063/1.3525876 (130 pages)

Remember: PAC Does Conferences

As the official monthly journal of IUPAC, *Pure and Applied Chemistry* also includes papers based on presentations made at IUPAC-sponsored international scientific events. Following are recent examples:

- 2nd Regional Symposium on Electrochemistry: South East Europe (RSE SEE-2), *PAC* Vol. 83, No. 2, 2011
- 18th International Conference on Organic Synthesis (ICOS-18), *PAC* Vol. 83, No. 3, 2011
- XXIIIrd IUPAC Symposium on Photochemistry, *PAC* Vol. 83, No. 4, 2011
- 14th International Symposium on Solubility Phenomena and Related Equilibrium Phenomena (ISSP-14), *PAC* Vol. 83, No. 5, 2011
- 21st International Conference on Chemical Thermodynamics (ICCT-21), *PAC* Vol. 83, No. 6, 2011
- 20th International Conference on Physical Organic Chemistry (ICPOC-20), *PAC* ASAP
- 11th Eurasia Conference on Chemical Sciences, *PAC* ASAP
- 3rd International Conference on Green Chemistry (ICGC-3), *PAC* ASAP



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Chemical Hazards in Food

IUFoST Scientific Information Bulletin, January 2011

reviewed by Christoph von-holst

This summary highlights some aspects of the International Union of Food Science and Technology's recent, informative report on chemical hazards in food. Released in January 2011, this *Scientific Information Bulletin* presents authoritative science on this important food science issue.

The report covers natural and environmental toxins and contaminants. The group of natural toxins and contaminants are discussed in great detail, including compounds such as lectins, glycoalkaloids oxalates, and cyanogenic alkaloids on the one hand and mycotoxins and shellfish toxins on the other. Mycotoxins are produced by a range of fungi and molds and have a high toxic potential. When talking about natural contaminants in food, they are one of the greatest potential risks to human health. Many of them, like aflatoxin B₁, are carcinogenic and may cause liver damages such as ochratoxin. Typical food items that might contain mycotoxins at elevated levels are corn, peanuts, and three nuts. Specific climate conditions, such as high humidity, favor the formation of mycotoxins. In order to protect consumers from potential adverse health effects, many countries have introduced legal limits for mycotoxins in different food items.

Chlorinated compounds are an example of the type of environmental contaminants that may accumulate at high levels in food and foodstuff, mainly because of their persistence in the environment. Several measures have been taken by government authorities to cope with these types of contaminants, including banning some of these substances. For instance, in many countries, polychlorinated biphenyls (PCBs) have been banned from use in industry. This decision also contributed to reducing polychlorinated dibenzo-p-dioxins (PCDDs), dibenzofurans (PCDFs), since PCBs often contain traces thereof. Furthermore, legal limits in food and foodstuffs have been established for many chlorinated substances, including PCDD/Fs. A number of polycyclic aromatic hydrocarbon substances, such as

Benzo(a) pyrene, have very high toxic profiles. They can enter into our food through various pathways, including via thermal processing or contaminated oil containing these substances. Since the complexity of this group renders the setting of limits more difficult, specific marker substances are often utilized, for which legal limits have been set in various food items.

There are also contaminants in food that derive from specific processing conditions. For instance, acrylamide is a known carcinogen and is formed during baking, frying, or roasting of various food items. Based upon intensive research conducted to identify the mechanism of the formation of acrylamide, an online toolbox was developed to help food processors reduce the undesirable formation of acrylamide. Other examples of process-derived contaminants are chloropropanols and furans.

Melamine is an example of a contaminant that was illegally added to food to simulate a higher protein content in samples. This was possible (1) since melamine is characterized by a high nitrogen content and (2) the commonly used techniques for protein determination, namely Kjeldahl and Dumas, measure protein via the determination of nitrogen. In 2008, melamine was found at high levels in milk powder, resulting in the death of several babies.

Another group of contaminants found in food results from the residues of pesticides and veterinary drugs that have been used under regulated conditions. Maximum residue limits (MRLs) have been set for many of these substances and food samples are often checked to determine if they are within safe limits.

The report also elaborates on the criteria for how MRLs limits are established. Three aspects are taken into account, namely (1) toxic characteristics of the substance concerned, (2) conclusions from good manufacturing practice, and (3) the availability of appropriate analytical methods to enforce MRLs.

A key factor in enforcing legal limits of target analytes in food samples is the availability of appropriate analytical methodology. Here, various strategies are pursued such as the use of screening methods enabling the laboratories to increase the sample throughput. Afterwards, positive samples



Bookworm

are analyzed by confirmatory methods to establish whether these samples comply with legal requirements or not. Methods to be used for official control purposes need to be validated against internationally recognized guidelines. There are trial validated methods available for specific analyte/matrix combinations, but in many cases single laboratories validated methods are applied.

The International Union of Food Science and Technology (IUFoST) is the global federation of national scientific organizations representing more than 200 000 food scientists and technologists from

over 65 countries. IUFoST has four regional groupings: ALACCTA representing Central and South America, EFFoST representing Europe, FIFSTA representing the ASEAN region and WAAFoST representing West Africa. IUFoST links the world's food scientists and technologists.

Christoph von-holst <christoph.von-holst@ec.europa.eu> is a member of the IUPAC Division on Chemistry and the Environment and its subcommittee on Food Chemistry. He works in the Institute for Reference Materials & Measurements of the European Commission—DG Joint Research Centre in Gel, Belgium.

Pharmaceutical Salts: Properties, Selection, and Use: 2nd Revised Edition

P. Heinrich Stahl and Camille G. Wermuth (editors)

ISBN: 978-3-90639-051-2

Hardcover, 388 pages, May 2011

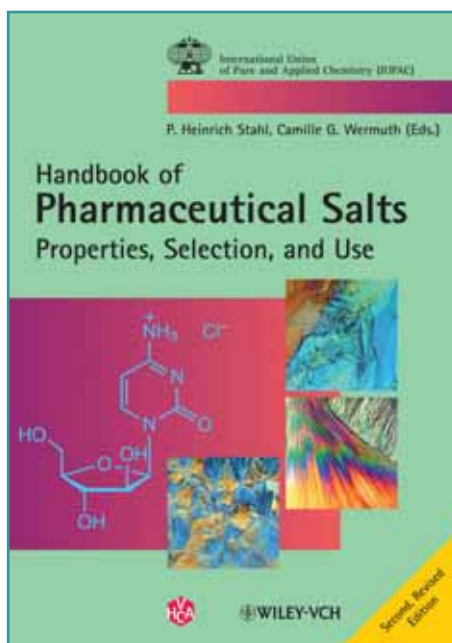
The first edition of this handbook collated the scientific literature on this topic that had otherwise been rather limited and scattered throughout numerous journals and patents. The result was a comprehensive resource that addresses the preparation, selection, and use of pharmaceutically active salts, examining the opportunities for increased efficacy and improved drug delivery provided by the selection of an optimal salt. This second, revised edition is designed to meet the continued interest in both the topic and the book.

Altogether, the contributions to this book by an international team of authors from academia and the pharmaceutical industry reflect the multidisciplinary nature of the science involved in selection of suitable salt forms for new drug products. They present the necessary theoretical foundations as well as a wealth of detailed practical experience in the choice of pharmaceutically active salts, taking great care to address every conceivable aspect of the preparation of pharmaceutical salts.

An introductory chapter presents a concise review of the various objectives in the pursuit of pharmaceutically active salts, followed by the theoretical background of salt formation. There then follow chapters on the practice of salt formation in an industrial R&D environment, as well as regulatory and patent issues. Practical examples for the practitioners at the lab bench are provided, before the book concludes with a comprehensive annotated compilation of the individual salt-forming acids and bases with their relevant properties, followed by an appendix containing tables with the acids and bases sorted alphabetically and by pKa, supplemented with other useful facts and data.

It is an essential reference for students of medicinal and pharmaceutical chemistry, and an indispensable handbook for R&D chemists, analytical chemists, biologists, development pharmacists, regulatory and patent specialists, and medicinal scientists engaged in preclinical development of drugs. In addition, this comprehensive and up-to-date guide is an instructive companion for all scientists

involved in the research and development of drugs and, in particular, of pharmaceutical dosage forms.



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METAL WHICH HAS AN
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Conference Call

Moscow Chemical Lyceum

by *Sergey E. Semenov, Sema L. Ioffe,
and Nikolay E. Nifantiev*

The Moscow Chemical Lyceum was founded in 1990 as a special school for talented children, offering extended education in chemistry and mathematics. It was established by the Educational Department of Government of Moscow, N.D. Zelinsky Institute of Organic Chemistry of the Russian Academy of Sciences (Zelinsky Institute), and the Moscow House of Scientific Technical Creative Work of Youth.

The Lyceum is for students in their last three years of secondary school (9th–11th grade, 15 to 17 years old). With two classes per grade, more than 100 pupils are simultaneously trained. Enrollment in the school is competitive: potential pupils from Moscow and the surrounding area must take special tests in chemistry and mathematics. Typically, only 1 student out of 10 candidates is admitted. Those who are admitted receive a free education. Those who are not accepted into the Lyceum can still take advantage of evening classes. A special program allows any pupil in 8th–11th grades from other Moscow schools to receive systematic training in chemistry.

The main peculiarity of education at the Moscow Chemistry Lyceum is the training students receive in modern research methods. Pupils in the 10th–11th grades have an entire day every week set aside specifically for their research projects. Students have access to a fully equipped laboratory for organic synthesis

and physicochemical studies of the synthesized substances. In addition to general chemistry classes, the Lyceum offers several special courses that facilitate students' understanding of experiments carried out. In addition, regular lectures and reports by leading Russian and foreign scientists on the key problems of chemical science enlarge the outlook of pupils. For example, on 14 February 2011, IUPAC President Nicole Moreau visited the Lyceum and attended a lecture by Nikolay E. Nifantiev of the Zelinsky Institute (a member of the IUPAC Organic and Biomolecular Chemistry Division) who provided an overview of his research on the synthesis of glycoconjugate vaccines.

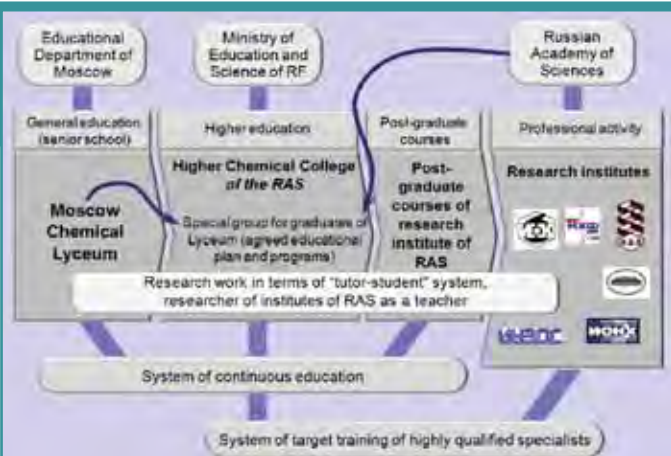
The Moscow Chemical Lyceum has strong relationships with many research institutes of the Russian Academy of Sciences, including the Zelinsky Institute, A.N. Nesmeyanov Institute of Organoelement Compounds, V.A. Engelhardt Institute of Molecular Biology, N.S. Kurnakov Institute of General and Inorganic Chemistry, N.N. Semenov Institute of Chemical Physics, and the M.M. Shemyakin and Yu.A. Ovchinnikov Institute of Bioorganic Chemistry. These connections allow pupils to participate in real scientific projects conducted in academic laboratories under the qualified guidance of researchers at the institutes.

It should be noted that the Lyceum is the first stage of a three-part system of "continuous chemical education" for preparing highly qualified students for scientific institutions in Russia. The system is based on deep integration of the senior school and higher school with research institutes of the Russian Academy of Sciences (see figure next page). In the framework of this system, Lyceum graduates enter the Higher Chemical College of the Russian Academy of Science. Courses at the Chemical College are organized by lecturers from the D.I. Mendeleev Russian University of Chemical Technology, Chemical Department of M.V. Lomonosov Moscow State University, and the Russian Academy of Sciences. Students at the college have a day set aside in their weekly schedule to continue the research they began at the Lyceum. Students who continue on with their chemistry education, take post-graduate courses at the research institutes of the Russian Academy. Upon successfully defending their thesis, a student is awarded a degree in chemical science that is comparable to a Ph.D.

Developed over the past 15 years, this system of chemical education has proven to be very efficient. A key part of its success may be that scientists from



IUPAC President Nicole J. Moreau (right center) attends a lecture by N.E. Nifantiev (above) of the Zelinsky Institute.



Basic scheme of "continuous chemical education" system for preparation of highly qualified specialists for scientific institutions of Russia.

the institutes of the Russian Academy of Science are paired with students who they mentor throughout their academic careers. As a result, even students at the Lyceum are often coauthors of scientific papers and conferences reports due to their valuable contributions to research projects.

Another measure of the success of the program is the impressive performance of Lyceum students in the Russian and International Chemistry Olympiads and in the International Science & Engineering Fair in the USA. In addition, the Lyceum is extensively involved with international exchange and collaboration programs, in particular with the Korean Science Academy, National Junior College of Singapore, and research organizations in Japan, India, USA, and other countries. Aside from extensive chemistry education, the pupils of the Lyceum have many opportunities to study other topics, such as foreign languages, music, theater arts, sports, and tourism.

 www.1303.ru

Materials Education

by Ram Prakash Singh

The **International Symposium on Materials Education (ISME-2011)** took place from 26–28 March 2011 in Yashada, Pune, India. The event was dedicated to the late Professor Rustum Roy, who founded the International Council of Materials Education (ICME) to further the cause of materials education in developed and developing countries.

Between 2006 and 2010, the ICME has organized six conferences, which were held in the USA, Singapore, Australia, Italy, and Brazil. The objective of the conference series is to popularize the subject among under- and postgraduates and young researchers and

to present the latest research in materials science and nanotechnology teaching to students and researchers.

This was the first time this symposium was held in India which has a strong base of materials science and nanotechnology and one of the world's fastest growing economies. Pune was a strategic choice of venue as it is a leading hub of the nation's growing economy and is considered to be the higher education capital of India.

The symposium featured 21 invited lectures by experts from France, Germany, Italy, UK, USA, Japan, and India. In addition, there were 34 short lectures, mainly given by young scientists from India, Nepal, and Sri Lanka. There were 58 poster presentations by young scientists, research scholars, and students from India and abroad. There were 50 participating scientists, technologists, and undergraduate and postgraduate students from industry, research laboratories, and academic institutions.



Presentations at the symposium covered a wide range of topics: soft matter, multiferroics, iron-based high-Tc superconductors, graphene, controlled and targeted drug delivery by nanoparticulates, nanomaterials synthesis by soft chemistry, surface and volume properties of nanomaterials, characterization of nanocomposites, new green bulk composites, spectroscopy of semiconductors, molecular science at surfaces, nanocomposite coatings, rheology of polymer melts in presence of nanoparticles, dendrimers and hyperbranched polymers, processing, characterization and fabrication of nanomaterials and their devices, fluorination of polymers and composites, turbulent drag reduction, and flocculation by polymers. Similarly there were lectures on materials education and integrated education in materials science for teachers at various institutions in India and abroad.

Six prizes were awarded to young scientists and research scholars for their the poster presentations.

 www.iiserpune.ac.in/isme

Where 2B & Y

Global Chemical Safety and Sustainability

1 August 2011, San Juan, Puerto Rico

The IUPAC Safety Training Program allows safety experts from developing countries to learn more about safety and environmental protective measures by visiting and working in plants of IUPAC Company Associates in the industrialized world. IUPAC administers the Safety Training Program to disseminate state-of-the-art knowledge on safety and environmental protection in chemical production. The beneficiaries are expected to use the training in their home countries to improve health, safety, and the environment.



A workshop about the Safety Training Program will take place at the 43rd IUPAC Congress under the theme "Industrial and Applied Chemistry." Similar workshops have been held at previous IUPAC General Assemblies and Congresses: Ottawa in 2003, Beijing in 2005, Turin in 2007, and Glasgow in 2009.

Each trainee participant will submit an abstract for a paper to be presented at the workshop; these abstracts will be critically reviewed in advance of acceptance of trainees' applications for the workshop. The critical review is intended to assure that the trainees have made tangible progress on disseminating safety training knowledge in their home countries. In addition, the workshop will include lectures by regional speakers who are experts in chemical health, safety, and environmental protection issues particular to the pharmaceutical and biotechnology industries. The workshop will be part of a symposium on chemical safety, and contributed papers in the area of chemical safety, health, and environmental protection will be accepted.

The proceedings and outcomes of the workshop will be available on the IUPAC project webpage. The workshop will include a discussion about improving and expanding the scope of the Safety Training Program.

For more information, see the IUPAC Congress website www.iupac2011.org and refer to scientific program session IAC600.

For more information, contact Task Group Chair Mark Cesa <mark.cesa@ineos.com>.

 www.iupac.org/web/ins/2011-004-2-022

Nuclear Chemistry

18–23 September 2011, Palermo, Sicily, Italy

The idea for the **International Nuclear Chemistry Congress** series came to Turan Ünak after reflecting on the need to redefine nuclear chemistry "as a large chemistry branch which covers all kind of chemical studies related to the radioactive materials and nuclear radiation and to their applications in different fields of science and technology." Now, after two successful congresses, it is time for the 3rd INCC, which will be held 18–23 September 2011 in Sicily, Italy.

These congresses serve as a forum for scientists from different subject areas where the use, production, investigation, or measurement of radioisotopes and nuclear radiation are contributing significantly to

technical progress. The next congress will emphasize the interdisciplinary aspects of nuclear radiation and radioisotopes. In this way, the technical program of the 3rd INCC will be designed to cover both fundamental and applied aspects of Radiochemistry, Radiation Chemistry, Radioanalytical Chemistry, Radiopharmaceuticals Chemistry, Cosmochemistry and Radioecology, Applied Nuclear Physics, and Education in Nuclear Chemistry.

This congress will provide an opportunity to discuss the nuclear accidents in Japan.

See **Mark Your Calendar** on page 35 for contact information.

 <http://3dtincc.mi.infn.it>

Chemistry and Sustainability

5-7 October 2011, Milano, Italy

CHEM-MED 2011, The International Chemical Event, to take place 5-7 October at Milan Fair Centre, is the only Italian fair that is part of celebrations for the International Year of Chemistry (IYC).

Among the numerous events at CHEM-MED 2011 is a special conference on **Chemistry and Sustainability**, dedicated to research on products, technologies, and services utilizing sustainable chemistry. It is being organized in collaboration with the Green Chemistry Interdivision Group of the Italian Chemical Society and is sponsored by IUPAC.

The introduction of clinically effective and economically valid procedures is a fundamental part of today's chemical industry. The aims of the conference are to discuss the implementation of the principles of sustainability in the sector and to strengthen the contact between the industrial and academic worlds, leading to a common goal. The organizing committee is made up of representatives from both the industrial and academic world. The program includes four 40-minute plenary lectures and four 15-minute lessons.

See **Mark Your Calendar** on page 35 for contact information.

 www.chem-med.eu

Australasian Polymer

12-15 February 2012, Hobart, Tasmania

The **33rd Australasian Polymer Symposium (33APS)**, will be held 12-15 February 2012 at Wrest Point Convention Centre in Hobart, Tasmania. The conference program will cover all areas of polymer science and engineering, including synthesis, characterization, processing, modeling, and materials. Topics will range from the latest techniques in polymer synthesis to applications in materials science, medicine, energy, and the environment.

Over the years, the APS has developed a strong reputation for bringing together the latest polymer research from top international and Australian polymer scientists. This year, it will again welcome a number of leading plenary and keynote speakers from around the world to what promises to be another exciting forum held within Hobart, a city of bustling markets, fun, fes-



tivals, entertainment, and fine restaurants.

Those wishing to submit an abstract should do so before 2 September 2011.

See **Mark Your Calendar** on page 36 for contact information.

 www.33aps.org.au

Biological Inorganic Chemistry

12-16 September 2012, Granada, Spain

The **11th European Biological Inorganic Chemistry Conference (EUROBIC11)** will take place 12-16 September 2012 in Granada, Spain.

For more information contact:

Prof. Josefa M^a González-Pérez, Antonio Matilla-Hernández and Juan Nicolás-Gutiérrez
Dept. of Inorganic Chemistry, Fac. Pharmacy,
University of Granada, 18071-Granada, Spain
Fax: 00 34 958246219
E-mail: info@eurobic11.com

 www.eurobic11.com

Philosophy of Chemistry

9–11 August 2011, Bogota, Colombia

Each year, the International Society for the Philosophy of Chemistry organizes a symposium which gathers the leading researchers working on philosophy and foundational issues of chemistry. This year, the **ISPC Conference** will be held 9–11 August in Bogota, Colombia, at the Universidad de los Andes.

Lectures will be on such areas as foundational concepts, ontology, methods, ethics and aesthetics, as well as to the nature of chemical explanation, the relationship between chemistry and other sciences, historical aspects of chemistry, sociology and linguistics of chemistry and educational aspects. The special theme of ISPC 2011 will be the roots of Avogadro's hypothesis, its development and impact on chemistry and related fields, as well as its implications and prob-

lems. Another special topic of interest will be the relationship between mathematics and chemistry, its historical, development and the current state of this relationship which has given rise to the new chemical subfield of mathematical chemistry.

The 2010 ISPC meeting was held at the University of Oxford and in all previous years has alternated between North America and Europe. This year, (2011), the meeting is taking place, for the first time, in Latin America, thanks to the importance that philosophy of chemistry has gained in this part of the world. Let us make ISPC 2011 a meeting where scholars from Europe and the Americas come together and a place where the worldwide philosophy of chemistry community will strengthen its relationships.

 <https://sites.google.com/site/intsocphilchem2011/home>

Chemistry for Sustainable Agriculture

15–18 February 2012, New Delhi, India

The **2nd International Conference on Agrochemicals Protecting Crops, Health, and Natural Environment—Role of Chemistry for Sustainable Agriculture** will be held in New Delhi, India, 15–18 February 2012.

The conference will provide a forum for scientists from different disciplines, industry, and other stakeholders to discuss the latest trends and discoveries in agrochemicals and deliberate on important issues of agricultural research. The conference will comprise a number of plenary and keynote lectures by the world's leading scientists. Besides new compounds, new concepts and new uses, the conference will cover other traditional areas of research such as pest diseases, weed and resistance management, exploring biodiversity for botanical and biopesticides, genetically modified crops, and nutraceuticals, as well as research into effects on human health, risk management, ecotoxicology, and remediation strategies. The conference will also deliberate on other key issues such as analytical chemistry; pesticide residues in crops, food commodities, water, beverages; and changes in pesticide regulation.

The main themes of the conference are as follows:

- New Generation Synthetic and Natural Agrochemicals
- Agrochemicals delivery systems towards occupational and environmental safety
- Pesticide and natural environment
- Pesticide resistance management.
- Biotechnology and Crop Protection—Current and Future Approaches
- Organic Approaches to Pest Management
- Pesticide Management for Human Safety and Food Security
- Pesticide Industry: Prospects and Constraints.
- Agrochemical Detection, Analysis and Quantification.
- Integrated Pest Management
- Nanotechnology and its Application in Agriculture and Health
- Chemical Fertilizers—Technologies for Improving Efficiency, Productivity and Reliability, Nutrient-Based Subsidy Policy
- Use of Geomatics in Farming System Research

See **Mark Your Calendar** on page 36 for contact information.

 www.apchne.com

Environmental Science

14–19 October 2012
Malargüe City, Argentina

The **2nd Argentinean Workshop in Environmental Science** will be held in Malargüe City, in the Mendoza Province of Argentina, from 14–19 October 2012. Similar to the 1st workshop held in Rosario in November 2009, this workshop will focus on the frontiers of environmental science.

One outcome of the 2009 meeting was an International Course on Industrial Water Pollution Control that was delivered by Bohumil Voleky from McGill University, Canada on 31 May to 4 June 2010. See for course overview at <www.biosorption.net/seminars/sbMEETarg.htm>.

In October 2012, younger and more experienced scientists will again have the opportunity to meet, present, and discuss all aspects of environmental science.

For more information, contact:

Prof. Luis Federico Sala
Facultad de Ciencias Bioquímicas y Farmacéuticas
Universidad Nacional de Rosario
Suipacha 570, S2002LRK-Rosario, Argentina
e-mail: sala@iquir-conicet.gov.ar
tel./fax: +54-341-4350214



This pond, near Malargüe City in Mendoza Province, Argentina, is called pozo de las ánimas o de las almas de los indios.

Mycotoxins and Phycotoxins

5–9 November 2012
Rotterdam, The Netherlands

The **7th Conference of The World Mycotoxin Forum®** and the **XIIIth IUPAC International Symposium on Mycotoxins and Phycotoxins** will be held jointly. This unique combined event, WMF meets IUPAC, will build on the success of the previous conferences which were held separately all over the world. WMF meets IUPAC will take place in Rotterdam, The Netherlands, 5–9 November 2012.

The aim of WMF meets IUPAC is to increase awareness of human and animal health risks due to natural toxicant contamination in agricultural commodities and seafood, and of potential risk-management options,

technologies, and strategies for minimized contamination. The event will focus in particular on mycotoxins, phycotoxins, and plant toxins. It will provide a unique platform for the food and feed

industry, regulatory authorities, and science to accomplish the following:

- exchange current information
- promote the harmonization of food and feed safety regulations and control procedures
- make recommendations for strategies enhancing the prevention and control of contamination
- ensure the safety and wholesomeness of an adequate food and feed supply

As a comprehensive overview, WMF meets IUPAC offers an excellent way to network and to share ideas, providing a reference source for anyone involved in these fields. The event will include:

- invited lectures and oral contributions in plenary meetings and parallel sessions
- poster sessions
- young scientists sessions
- workshops and satellite meetings
- spotlight presentations, case studies and industry updates
- an instrument/manufacturers exhibition

See Mark Your Calendar on page 36 for contact information.

 www.WMFmeetsIUPAC.org



Mark Your Calendar

Upcoming IUPAC-sponsored events
See also <http://www.iupac.org/indexes/Conferences>
for links to specific event websites

2011 (after 24 July)

 IUPAC poster prizes to be awarded

24–29 July 2011 • Plasma Chemistry • Philadelphia, Pennsylvania, USA

20th International Symposium on Plasma Chemistry

Professor Alexander Fridman, Drexel University, A. J. Drexel Plasma Institute, Philadelphia, PA, USA

Tel.: +1 215 895 1542, Fax: +1 215 895 1478, E-mail: fridman@drexel.edu

24–28 July 2011 • Organic Synthesis • Shanghai, China 

16th International Conference on Organometallic Chemistry Directed Toward Organic Synthesis

Dr. Shuli You, Chinese Academy of Sciences, Shanghai Institute of Organic Chemistry, State Key Laboratory of Organometallic Chemistry, 345 Fenglin Lu, Shanghai 2000032, China


Tel.: +86 21 6223 7360, Fax: +86 21 6260 9305, E-mail: slyou@mail.sioc.ac.cn

24–29 July 2011 • Novel Aromatic Compounds • Eugene, Oregon, USA 

14th International Symposium on Novel Aromatic Compounds

Prof. Michael M. Haley, Department of Chemistry, University of Oregon, Eugene, OR 97403-1253, USA

Tel.: +1 541 346 0456, Fax: +1 541 346 0487, E-mail: haley@uoregon.edu

29 July–4 August 2011 • IUPAC 46th General Assembly • San Juan, Puerto Rico 

IUPAC Secretariat

Tel.: +1 919 485-8700, Fax: +1 919 485-8706, E-mail: secretariat@iupac.org

30 July–7 August 2011 • 43rd IUPAC Congress • San Juan, Puerto Rico 

Chemistry Bridging Innovation Among the Americas and the World

Gabriel A. Infante, Pontifical Catholic University of Puerto Rico

E-mail: ginfante@iupac2011.org, www.iupac2011.org



30 July–5 August 2011 • Heterocyclic Chemistry • Glasgow, UK 

23rd International Conference on Heterocyclic Chemistry

Prof. Colin J. Suckling, University of Strathclyde, Department of Pure and Applied Chemistry, Glasgow G1 1XL, UK

Tel.: +44 141 548 2271, Fax: +44 141 548 5743, E-mail: c.j.suckling@strath.ac.uk

14–17 August 2011 • Macromolecular Complexes • Helsinki, Finland

14th International Symposium on Macromolecular Complexes

Prof. Heikki Tenhu, University of Helsinki, Department of Chemistry, Postbox 55, FIN-00014 Helsinki, Finland

Tel.: +358 919 150 334, Fax: +358 919 150 330, E-mail: heikki.tenhu@helsinki.fi

28 August–2 September 2011 • Solution Chemistry • La Grande Motte, France 

32nd International Conference on Solution Chemistry

Prof Pierre Turq, Université Pierre & Marie Curie, Laboratoire Liquides Ioniques & Interfaces, 4 Place Jussieu,

F-75005 Paris, France, Tel.: +33 1 44 27 31 08, Fax: +33 1 44 27 31 08, E-mail: pierre.turq@umpc.fr

28 August–2 September 2011 • Spectroscopicum • Armação de Búzios, Brazil

Colloquium Spectroscopicum Internationale XXXVII

Prof Bernhard Welz, Universidade Federal de Santa Catarina, Departamento de Química, Florianópolis 88040-900, Brazil, Tel.: +55 48 3733 8876, Fax: +55 48 3733 8876, E-mail: welz@qmc.ufswc.br

31 August–3 September 2011 • Chemistry for Life Sciences • Budapest, Hungary

4th European Conference on Chemistry for Life Sciences

Prof Tamas Kiss, University of Szeged, Department of Chemistry, P.O. Box 440, H-6701 Szeged, Hungary

Tel.: +36 62 544 337, Fax: +36 62 420 505, E-mail: tkiss@chem-u.szeged.hu

5–8 September 2011 • Sustainability & Economic Sufficiency • Bangkok, Thailand

14th Asian Chemical Congress

Prof. Supa Hannongbua, Kasetsart University, Department of Chemistry, 50 Phaholyothin Road, Chatuchak, Bangkok 10900, Thailand, Tel.: +66 2 562 5555 x 2140, Fax: +66 2 579 3955, E-mail: fscisph@ku.ac.th

5–8 September 2011 • Macromolecular Engineering • Cappadocia, Turkey

9th International Conference on Advanced Polymers via Macromolecular Engineering

Prof. Yusuf Yagci, Istanbul Technical University, Department of Chemistry, TR-34469 Maslak, Istanbul, Tel.: +90 212 285 3241, Fax: +90 212 285 6386, E-mail: yusuf@itu.edu.tr

11-15 September 2011 • Boron Chemistry • Niagara Falls, Canada

XIVth International Meeting on Boron Chemistry

Prof. John F. Valliant, McMaster University, Department of Chemistry, 1280 Main Street West, Hamilton, ON L8S 4M1, Canada, E-mail: valliant@mcmaster.ca

11-15 September 2011 • Analytical Chemistry • Belgrade, Serbia

Euroanalysis XVI

Prof. Slavica Ražić, University of Belgrade, Department of Analytical Chemistry, P.O. Box 146, SRB-11001 Belgrade, Serbia, Tel.: +381 11 3951 208, Fax: +381 11 3951 208, E-mail: slavica.razic@pharmacy.bg.ac.rs

18-22 September 2011 • Drug Discovery • Zadar, Croatia

2nd World Conference on Physico-Chemical Methods in Drug Discovery and Development

Professor Biserka Cetina-Cizmek, PLIVA d.o.o., Zagreb, Croatia

Tel.: +385 98 196 6807, Fax: +385 1 373 3640, E-mail: Biserka.Cetina-Cizmek@pliva.com

18-23 September 2011 • Nuclear Chemistry • Palermo, Italy

3rd International Nuclear Chemistry Congress

Prof. Flavia Groppi, Università degli Studi di Milano, LASA Laboratory, Via F. Cervi, 201, I-20090 Segrate, Milano, Italy, Tel.: +39 250 319 568, Fax: +39 250 319 543, E-mail: 3rdINCC@mi.infn.it

25-30 September 2011 • General and Applied Chemistry • Volgograd, Russia

XIXth Mendeleev Congress on General and Applied Chemistry

Prof. Alexander Navrotsky, Volgograd State Technical University, Polymer Chemistry Department, Lenin Avenue, 28, RF-400131 Volgograd, Russia, Tel: +7 1 44 27 31 08, Fax: +7 1 44 27 38 34, E-mail: navrotsky@vstu.ru

27-29 September 2011 • Renewable and Sustainable Energy • Kuala Lumpur, Malaysia

19th International ChemRAWN Conference on Renewable and Sustainable Energy from Biological Sources

Prof. Ting-Kueh Soon, Institut Kimia Malaysia, 127 B Jalan Aminuddin Baki, Tam Tun Dr Ismail, 60000 Kuala Lumpur, Malaysia, Tel.: +60 3 7728 3272, Fax: +60 3 7728 9909, E-mail: soontk@ikm.org.my

5-7 October 2011 • Chemical Industry and Sustainability • Milano, Italy

S-Chem: Chemistry Industry and Sustainability

Prof. Angelo Albini, Università degli Studi di Pavia, Dipartimento de Chimica Organica, Via Taramelli 10 I-27100 Pavia, Italy, Tel.: +39 0 382 987 316, Fax: +39 0 382 987 323, E-mail: angelo.albini@unipv.it

11-14 October 2011 • Novel Materials and Their Synthesis • Shanghai, China

7th International Symposium on Novel Materials and Their Synthesis

Prof. Yuping Wu, Fudan University, Department of Chemistry, New Energy and Materials Laboratory, Shanghai 200433, China, Tel.: +86 21 545 664 223, Fax: +86 21 545 664 223, E-mail: wuyup@fudan.edu.cn

29 November-2 December 2011 • Medicinal Chemistry • Tokyo, Japan

8th International Medicinal Chemistry Symposium

Professor Yuusako Yokoyama, Toho University, Chiba, Japan

Tel: +81 47 472 1589, Fax: +81 47 472 1595, E-mail: yokoyama@phar.toho-u.ac.jp

2012

6-9 January 2012 • Polymers and Organic Chemistry • Doha, Qatar

14th International IUPAC Conference on Polymers and Organic Chemistry

Prof Hassan S. Bazzi, Science Program Coordinator, Texas A & M University at Qatar, P.O. Box 23874, Doha, Qatar Tel.: +974 423 0018, Fax: +974 423 0060, E-mail: bazzi@tamu.edu

12-15 February 2012 • Polymer • Hobart, Australia

33rd Australasian Polymer Symposium

Prof Sébastien Perrier Director, Key Centre for Polymers and Colloids, School of Chemistry, University of Sydney, Sydney, NSW 2006, Australia, Tel.: +61 2 9351 3366, Fax: +61 2 9351 3329, E-mail: s.perrier@chem.usyd.edu.au

15-18 February 2012 • The Role of Chemistry for Sustainable Agriculture • Pusa, Delhi, India

2nd International Conference on Agrochemicals Protecting Crops, Health and Natural Environment

Dr. Najam A. Shakil, Indian Agricultural Research Institute, Division of Agricultural Chemicals, New Delhi 110 012, India, Tel.: +91 981 819 6164, Fax: +91 11 2584 3272, E-mail: iamshakil@gmail.com

Conference Call

26–30 March 2012 • Polymer Characterization • Dubrovnik, Croatia

20th International Conference on Polymer Characterization - World Forum on Advanced Materials
Dr Vera Kovacevic, University of Zagreb, Department of Chemical Engineering & Technology, Marulicev Trg., 19,
HR-10000 Zagreb, Croatia, Tel.: +385 1 459 7188, Fax: +385 1 459 7260, E-mail: polychar20@fkit.hr

16–21 April 2012 • Chemical Sciences • Corfu, Greece

12th Eurasia Conference on Chemical Sciences
Prof Nick Hadjiliadis, University of Ioannina, Dept. of Chemistry, GR-45110 Ioannina, Greece
Tel.: +30 2 651 008 420, Fax: +30 2 651 008 786, E-mail: nhadjis@uoi.gr

24–29 June 2012 • Macromolecules • Blacksburg, Virginia, USA

44th International Symposium on Macromolecules - IUPAC World Polymer Congress
Prof Timothy E. Long, Virginia Polytechnic University, Chemistry Dpt, VA 24061, USA
Tel.: +1 540 231 2480, Fax: +1 540 231 8517, E-mail: telong@vtu.edu

1–6 July 2012 • Organic Synthesis • Melbourne, Australia

19th International Conference on Organic Synthesis
Prof Mark Rizzacasa, University of Melbourne, School of Chemistry, The Bio21 Institute, Melbourne, Victoria 3010,
Australia, Tel.: +61 3 3844 2397, Fax: +61 3 3947 8396, E-mail: masr@unimelb.edu.au

15–20 July 2012 • Photochemistry • Coimbra, Portugal

XXIVth IUPAC Symposium on Photochemistry
Prof Hugh D. Burrows, University of Coimbra, Dpt of Chemistry, P-3004 535 Coimbra, Portugal
Tel.: +351 239 854 482, FAX: +351 239 827 703, E-mail: burrows@ci.uc.pt

22–27 July 2012 • Carbohydrate • Madrid, Spain

XVIth International Carbohydrate Symposium
Prof Jesús Jiménez-Barbero, Centro de Investigaciones Biológicas, Consejo Superior de Investigaciones Ciencias,
Ramiro de Maeztu 9, E-28040 Madrid, Spain
Tel.: +34 91 837 3112, Fax: +34 91 536 0432, E-mail: jjbarbero@cib.csic.es

5–10 August 2012 • Chemical Thermodynamics • Búzios, Brazil

22nd International Conference on Chemical Thermodynamics and 67th Calorimetry Conference
Prof. Watson Loh, Universidade de Estadual de Campinas, Instituto de Química, Caixa Postal 6154, Campinas, São
Paulo 13083-970, Brazil, Tel.: +55 193 521 3001, Fax: +55 193 521 3023, E-mail: wloh@iqm.unicamp.br

8–12 October 2012 • Pesticide and Environmental Safety • Beijing, China

4th International Symposium on Pesticide and Environmental Safety & 8th International Workshop on Crop
Protection Chemistry and Regulatory Harmonization
Prof. Zhang Jing, China Agricultural University, Centre for Chemicals Applications Technology, Yuanmingyuan
West Road, Beijing 100193, China, Tel.: +86 10 6273 1456, Fax: +86 10 6273 3688, E-mail: zj810515@163.com

5–9 November 2012 • Mycotoxin • Rotterdam, Netherlands

7th World Mycotoxin Forum and XIIIth International IUPAC Symposium on Mycotoxins & Phycotoxins
Dr Hans P. van Egmond, RIKILT-Wageningen University & Research Centre, Institute of Food Safety, Akkermaalsbos
2, P.O. Box 230, NL-6708 AE Wageningen, Netherlands
Tel: +31 317 480 379, Fax: +31 317 417 717, E-mail: hans.vanegmond@wur.nl

Visas

It is a condition of sponsorships that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all bona fide chemists from throughout the world to attend irrespective of race, religion, or political philosophy. IUPAC sponsorship implies that entry visas will be granted to all bona fide chemists provided application is made not less than three months in advance. If a visa is not granted one month before the meeting, the IUPAC Secretariat should be notified without delay by the applicant.

How to Apply for IUPAC Sponsorship

Conference organizers are invited to complete an Application for IUPAC Sponsorship (AIS) preferably 2 years and at least 12 months before the conference. Further information on granting sponsorship is included in the AIS and is available upon request from the IUPAC Secretariat or online.

 www.iupac.org

World Forum for Advanced Materials

by Mickael Hess

The **19th World Forum for Advanced Materials**, POLYCHAR 19, was held in Kathmandu, the capital of Nepal, which started on 20 March 2011 with the Short Course on Polymer Characterization and ended on 24 March. This IUPAC-sponsored event was organized by Rameshwar Adhikari and his team from the Tribhuvan University Kathmandu and by the Nepal Polymer Institute Kathmandu.

The conference began with a traditional Nepalese inauguration ceremony that took place in the Open Theatre of the Park Village Resort Hotel. Chaired by the vice chancellor of Tribhuvan University, Madhab Prasad Sharma, the ceremony received much public attention because it featured a welcome address by the Right Honourable Prime Minister of Nepal, Jhala Nath Khanal. In his address, he stressed the relevance of holding this globally important materials science meeting in Nepal during the International Year of Chemistry. The Opening Ceremony was closed with a welcome address by a representative of the IUPAC Polymer Division. The conference was broadcast and publicized by several national Nepali media including Himalayan Television, Kantipur Television, Nepal Television, radios stations, and the Nepali national daily and weekly newspapers.

The scientific program covered a broad range of materials science topics with sessions focussing on Predictive Methods and Simulations, Nano-and Smart Materials, Electrical and Dielectrical Properties, Surfaces, Interfaces and Tribology, Mechanical Properties and Performance, Rheology and Processing, Structure-Properties Relationships, Materials Synthesis and Characterization, Biomaterials, and Materials for Energy and Recycling. In total, there were 137 oral contributions and 117 posters with 382 registered participants from 46 countries. The six keynote speakers represented six continents.

The conference began with a Short Course in Polymer Characterization, a traditional one-day tutorial taught by distinguished specialists. Chaired by Valerio Causin (University of Padova, Italy) and Sven Henning (Fraunhofer institute for Micromechanics,

Halle, Germany), it covered a wide range of topics. Following is a brief sampling: Polymer Tribology (Witold Brostow, University of North Texas, Denton, USA), Polymer Characterization by Scattering Techniques (Jean-Michel Guenet, Institute Charles Sadron, Strasbourg, France), Dynamic-Mechanical and Calorimetric Analysis of Polymers (Michael Hess, University of Siegen, Germany), Chromatographic Characterization of Polymers (Dusan Berek, Slovak Academy of Sciences, Slovakia), and Trends in Chemistry of Nanocomposites (Anatolii D. Pomogailo, Russian Academy of Sciences, Moscow, Russia). Participants were provided with hand-outs of the teaching material and the lecturers were available for discussions throughout the duration of the conference.

It is always difficult to select specific contributions from the multitude of excellent presentations reflecting the wide span of aspects of Materials Science. One main focus of POLYCHAR 19 certainly was systems related with submicron structures in different fields of materials science. "Nano" was the magical term in many contributions

that sneaked into all fields mentioned above, as these examples show:

- Greiner (Marburg, Germany): "All-Biodegradable Functional Water-Stable Polymer Nanofibre Nonwovens by Green Electrospinning"
- H. Schönherr (Siegen, Germany): "Block-Copolymer Nanocapsules for Advanced Wound Management- Fabrication, Structure, and Properties"
- B. Hsiao (New York, USA): "Highly Efficient Nanofibrous Membranes for Water Purification"
- L. Leibler (Paris, France): "Creating and Controlling Structure and Dynamics on Nano- and Meso Scales Yields Self-Healing"
- M. Matsuo (Dalian, China): "Electric- and Dielectric Properties of Nano-Composites Prepared by Gelation/Crystallization from Solution"
- J.-J. Pireaux (Namur, Belgium): "Spectroscopic Characterization of Hybrid Organic-Inorganic Materials at the Nanoscale"

As these excerpted lecture titles clearly show, the conference tended to focus on structure, properties, and applications of nanoscopic systems and environ-



Byung-Wook Jo, Chosun University, Korea, with his Paul J. Flory Polymer Research Prize.



mental and bio-medical applications. There were vivid discussions throughout the breaks and after the daily program.

The highlight of each POLYCHAR conference is the distribution of awards before the closing ceremony. The prestigious Paul J. Flory Polymer Research Prize that was given ex aequo to Byung-Wook Jo of Chosun University in Korea and to Alejandro Mueller of Universidad Simón Bolívar in Venezuela for their outstanding contributions to the field of polymer drugs and confined crystallization in nanostructured polymers, respectively.

POLYCHAR's International Materials Science Prize was given to Sven Henning, Fraunhofer Institute for Materials Mechanics, Halle, Germany, for his contributions to electron microscopy of nano-structured polymers and biomaterials.

Three IUPAC Poster Prizes were awarded:

- Rujirat Longloilert (Chulalongkorn University, Bangkok, Thailand): "Novel Silica Source for Synthesis of MCM-48 via Sol-Gel Process"
- Marília M. Horn (Universidade de São Paulo, São Carlos): "Rheological Characterization of Chitosan/Starch Blends: Variation in Polyols and Amylopectin Content"
- Mykola Borzenkov (Lviv Polytechnic National University, Lviv): "Novel Surface Active Monomers Based on Tert-Butylperoxy-6-Hydroxyhexanoate"

The Jürgen Springer and the Bruce Hartmann Prize for Young Scientists went to:

- Chengcheng Yang (University of Pisa, Pisa): "Designed Coating Surfaces from Water-Borne Semifluorinated Polymer Particles Obtained by Cyclodextrin-Assisted Emulsion Polymerization"
- Tea Datashvili (University of North Texas, Denton, Texas, USA): "Well-Ordered SiO₂ Rods and Recycled Polyethylene + Silica Functionalized Wood Composites"

The Carl Klason Prize for the best Students' Presentation were awarded to the following students:

- Guy Mechrez (Israel Institute of Technology, Haifa): "High-Elongation MWNT Networks: Preparation, Characterization and Nanostructuring"
- Larisa Dobircau (University of Rouen, France): "Acoustic Properties of a 100% Natural Composite Reinforced by Bamboo Fibers"

- Severene Rose (ESPCI, Paris): "Nano-Hybrids PDMA/Silica Hydrogels: From Structure to Properties"

Diplomas of Distinction for their excellent scientific work and presentation of it were handed out to:

- Nicolaas Christiaan Basson (University of Stellenbosch, Stellenbosch): "The Effect of Compatibilizer on the Properties of Impact Polypropylene/Pinus Radiata Wood Polymer Composites"
- Paramjit Kaur (Thapar University, Patiala, Punjab): "Synthesis of Polylactide under Inert Atmosphere and Vacuum"
- Santosh Khanal (Tribhuvan University, Kathmandu): "Preparation and Properties of Styrene-Isoprene-Styrene (SIS) Triblock Copolymer Based Nanocomposites"

The conference was sponsored by the Tribhuvan University, Kathmandu, Nepal Academy of Science and Technology, the LECAP Laboratory of Prof. Jean-Marc Saiter, University of Rouen, France, the Third World Academy of Sciences and Technology, the Nepal Tourism Board, the Park Village Hotel & Resort, Kathmandu, Nepal Polymer institute, Kathmandu, the University Grants Commission, Nepal, the International Centre for Theoretical Physics, the Alexander von Humboldt Foundation, Germany, the Polymer Standards Service, Germany, and Gulf Air, Bahrain.

The name POLYCHAR stands for polymer characterization and dates back to the days when the it was an annual event at the University of North Texas in Denton, Texas. Over the years it has expanded to cover the whole range of polymeric materials as well non-polymeric materials science. In 2004, POLYCHAR was held in Guimarães, Portugal, the first time outside Texas. It was followed by Singapore in 2005, Nara (Japan) in 2006, Buzios (Brasil) in 2007, Lucknow (India) in 2008, Rouen (France) in 2009, Siegen (Germany) in 2010. POLYCHAR 20 is scheduled for 26-30 March 2012 in Dubrovnik, Croatia.



Prof. Alejandro Mueller, Universidad Simón Bolívar, Caracas, Venezuela, receiving the Paul J. Flory Polymer Research Prize.



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