

The News Magazine of the
International Union of Pure and
Applied Chemistry (IUPAC)

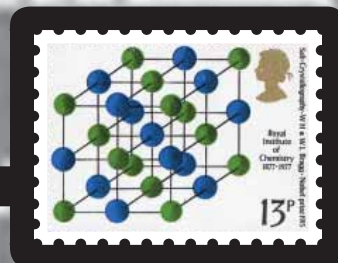
CHEMISTRY

International

January-February 2007
Volume 29 No. 1



Chemistry and Stamps: International Education and Fun



Chemistry According
to Kids

Science4Life



From the Editor

CHEMISTRY International

The News Magazine of the
International Union of Pure and
Applied Chemistry (IUPAC)

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With this first issue of the new year, I am delighted to publish the first of what I hope will become a long-standing section in *CI*: Stamps International. I do not know much about stamps, but it did not take long for Dan to convince me that stamps and chemistry share many interesting stories, and that sharing these with *CI* readers would be a lot of fun. Stamps offer endless subjects, all worth a commemoration in some way: a special event, an anniversary, a discovery, an award, etc. All of these are found on stamps the world over.

I met Dan, a.k.a. Daniel Rabinovich, in Beijing during the 2005 General Assembly. Dan was a Young Observer, but obviously he did more than observe! Over a light discussion during breakfast, our talk quickly turned to Dan's hobby: stamps. Not just any stamps, but in particular stamps that have to do with science and chemistry. Dan's enthusiasm was contagious, and he explained that he is also the editor



of *Philatelia Chimica et Physica*, the journal of the Chemistry and Physics on Stamps Study Unit of the American Topical Association. Little did I know that such a quarterly publication existed! (For more info see <www.cpossu.org>). Our plan has now come to fruition; Dan will regularly tease our curiosity by presenting specific stamps along with notes about their origin. See Dan's first rendering on page 3.

Also in this issue of *CI* (see p. 4), it is a delight to publish the winning entries from a 2006 chemistry poster competition for teenagers organized by Science Across the World. The theme of the 2006 competition was "Chemistry for Humanity," which echoed the focus of the International Conference on Chemical Education held in August 2006 in Korea. With 944 entries from 32 countries, the competition was a true international event. Full of imagination, these youngsters might become the scientists of tomorrow. By recognizing their talent, perhaps these students will be encouraged to cultivate an interest in the world's well-being. Therefore, a few pages of this issue glow brightly with a collection of the winning posters—a simple way to say thank you to every one who sent in a drawing, and also to the contest coordinators and jury members.

I wish you all the best for 2007.

Fabienne Meyers

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www.iupac.org/publications/ci

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The IUPAC Project System: Evaluation of Completed Projects

by Ron D. Weir



In 2000, IUPAC introduced a new project system to encourage projects that support the aims and objectives of the organization and allow any scientist or engineer worldwide to participate in IUPAC-funded activities. Under the new system, the protocol for submitting a project proposal is simple and streamlined. In the May-June 2006

CI, Gus Somsen¹ described succinctly the why, how, when, and where of the process. In this column, I will review what mechanisms shall be put in place to evaluate each activity initiated under the project system.

Regardless of the source of funding for any expenditure, whether we are using our own money or that of someone else, it is normal and appropriate to ask the question "Was value for money achieved?" Because IUPAC is a responsible organization that relies on funding from national governments—through their chemical societies and institutions—it has put in place an Evaluation Committee whose tasks include (i) determining the appropriate criteria for retrospective evaluation of each project; (ii) evaluating all projects for conformance to plan; (iii) evaluating the impact of projects on the relevant chemical community; (iv) reporting to the IUPAC Bureau in writing annually on the results of the evaluation; and (v) informing, after discussion in the Bureau, the National Adhering Organizations about the completed evaluations.

Since the new project system was implemented about six years ago, around 200 projects have been completed. For many of these projects there has been a short time interval since their completion—perhaps too short in some cases to assess a meaningful impact. Readers can easily read about the many IUPAC projects underway, as well as those already completed, at <www.iupac.org/projects>. The types of projects include recom-

mendations, technical reports, policy and strategy documents, nomenclature, reference data, and books.

The main challenge for the Evaluation Committee is determining the appropriate criteria for retrospective evaluation of each project. For some types of projects, the number of citations quoted in the open literature provides one measure of the impact. The citation is the natural criterion for those projects that fall within the reference data category since papers and publications that use these data make the appropriate reference. One example of measurable impact is from the project Evaluated Kinetic Data for Atmospheric Chemistry, for which the huge quantity of data have been compiled within a database accessed via either the IUPAC website or that of the University of Cambridge in the UK (see Tools of the Trade on p. 15). The literature citations for this project currently number close to 2 000, with an additional 6 500 hits on the database per week. The extraordinary interest in this project is due to the concern worldwide about climate change and the search to obtain associated quantitative data that may influence policies and actions by national governments and the United Nations.

Projects in the policy/strategy category appear, superficially, to be less likely to generate citations. For example, it is interesting to note that one of these projects, the Impact of Scientific Weapons Developments on the Chemical Weapons Convention, has generated 30 citations. The printed outcome was a special issue of the IUPAC journal *Pure and Applied Chemistry* (Vol 74, No 12, pp. 2229-2352 [2002]).


Nomenclature projects or alike do not generate citations, which is an expected outcome. For example, the IUPAC Green Book, *Quantities, Units and Symbols in Physical Chemistry*, sets out recommendations and rules which are in use worldwide. Such standards are adopted by many international journals and textbooks, in university instruction, and for general research, and yet

it is understood that they are used without reference. The same is true for the nomenclature conventions captured in IUPAC's other "color" books: organic (blue book), inorganic (red book), chemical terminology (gold book), macromolecules (purple), analytical (orange), biochemical (white), and clinical laboratory science (silver).

... it is normal and appropriate to ask the question "Was value for money achieved?"

It is evident that a single criterion cannot be used to provide the evaluations. A broader index system needs to be devised and the Evaluation Committee is in the process of providing this to the Bureau. By way of anecdotes, as we attend international scientific meetings, many of us receive positive feedback about IUPAC projects such as Green Chemistry in Africa, the postgraduate course in polymer science, or yet the short course in polymer characterization or the Inter-Union project on education. For other projects, we receive meagre formal feedback, or even the remark that such or such reports or recommendations were not known.

The impact made by each projects may take many years to bear fruit and even then it is not clear what the best quantitative measures are to assess the

impact. The challenge for the Evaluation Committee is clear and our plan is have a report in time for the next General Assembly in Torino, Italy, in August 2007. Input and suggestions for the Evaluation Committee are welcome at <weirr@rmc.ca>. 

References

1. G. Somsen, "The IUPAC Project System Revisited," *Chemistry International* 28(3), 2-3, 2006.

Ron Weir <weirr@rmc.ca>, a long-time member of IUPAC, is from the Royal Military College of Canada, in Kingston, Ontario. He is currently chairman of the Evaluation Committee, but is also past president of the Physical and Biophysical Chemistry Division, divisional representative on the Interdivisional Committee on Terminology, Nomenclature and Symbols (ICTNS), and member of the Editorial Advisory Board of the IUPAC journal *Pure and Applied Chemistry*.

Stamps International

by Daniel Rabinovich

The hobby of kings? The king of hobbies? Either way, stamp collecting is certainly one of the most popular and international hobbies, attracting people from all walks of life, regardless of age, race, religion, or nationality. Many postage stamps have been issued to commemorate events and educate the general public on topics ranging from history and geography to art and literature. A number of stamps also celebrate scientific discoveries or honor well-known scientists and can be used as simple yet powerful teaching tools in the classroom or to illustrate a technical presentation. This new section of *CI* will feature interesting or visually appealing chemistry-related postage stamps from different countries, and will

thus underscore the international character of both philately and our science.

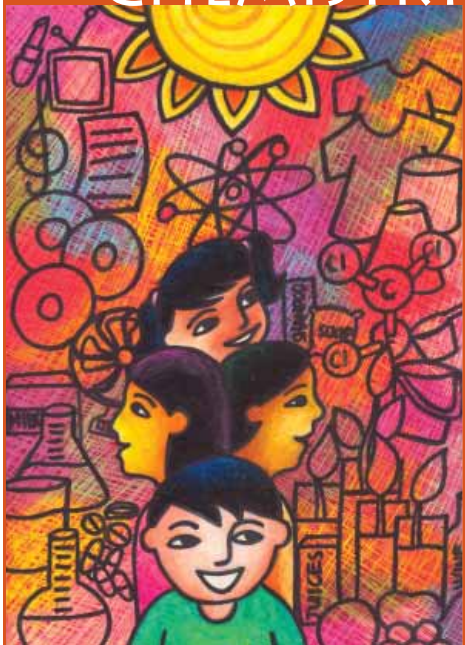


The postage stamp shown here was issued by the USSR on 15 June 1965 to publicize the 20th IUPAC Congress, held in Moscow a month later (12-18 July). It is the only stamp that I am aware of that has IUPAC as the central theme and it is also one of my favorites:

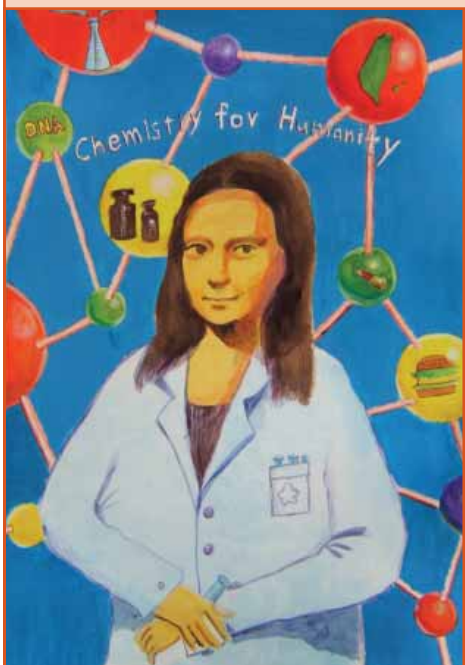
the names of both the organization and the host city are spelled with chemical symbols! In addition, the stamp shows a molecular diagram of an unidentified substance and honors the chemical (petrochemical?) industry by using a retort as a background. Remarkably, especially for a stamp issued more than 40 years ago, the bright rose ink used for the globe diagram and for the face value of the stamp (4 kopecs) are fluorescent!

Daniel Rabinovich <drabinov@email.uncc.edu> is a professor in the Department of Chemistry at the University of North Carolina at Charlotte. His research interests include synthetic and structural inorganic, organometallic, and bioinorganic chemistry. He is also the editor of *Philatelia Chimica et Physica*, a quarterly publication dedicated to the study of postage stamps related to chemistry and physics <www.cpossu.org>.

CHEMISTRY ACCORDING TO KIDS



Rosalyn T. Yu (age 14), Philippines



Hsin-Wei Wang (age 14), Taiwan

by *Lida Schoen*

In order to celebrate 2006 as the Year of Chemistry in Korea, the Korean Chemical Society (KCS) initiated and sponsored a global poster competition. Choon Do of the KCS collaborated with IUPAC's Committee on Chemistry Education (CCE) and Lida Schoen of the Science Across the World program to launch the poster competition, which culminated with a display during the International Conference on Chemical Education (ICCE) held in Seoul in August 2006. Lida Schoen administered and managed the competition with the support of the SAW network.

Chemistry for Humanity

The theme for this poster competition was that of the conference: "Chemistry for Humanity." Therefore, students who entered the contest were asked to visualize their ideas on this general concept. The contest offered two age categories: 10–13 and 14–16. Altogether, 944 entries were received from 32 different countries: 427 on paper and 517 electronic files in various formats. From these entries, 13 posters from the age 10–13 category and 41 posters from the age 14–16 category were preselected. There were no separate categories for paper and electronic entries. Criteria for the jury were as follows:

- relevance to the theme
- clear message, communication value
- artistic value: color, composition
- universally understandable, with little or no text



Maria Prasilova (age 16), Slovak Republic

An exhibition of these posters was on display at the 19th International Conference on Chemical Education (ICCE) from 12–17 August 2006 in Seoul, Korea. Around 300 chemists from all over the world were able to admire the selections (for more about the ICCE, see conference report on p. 32).

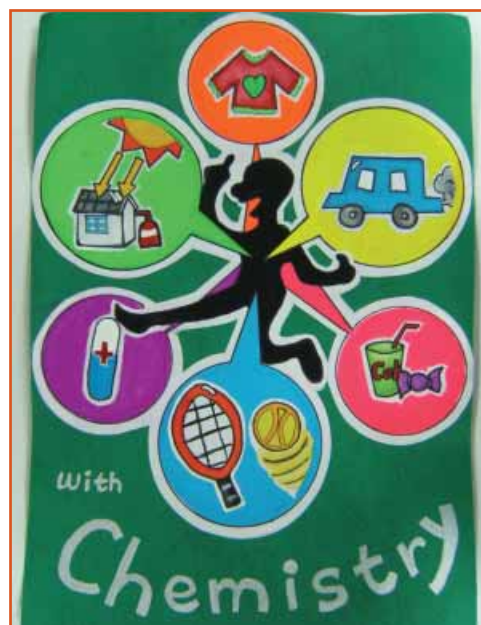
Tough Choices for Judges

The entries displayed so much creativity, imagination, and ability that the panel of judges could hardly manage to select the best. The jury, consisting of Lida Schoen (Netherlands), Eva Åkesson (Sweden), Margaret-Ann Armour (Canada), Peter Atkins (U.K.), Karl Brachtl (Austria), Marianne Cutler (U.K.), Morton Hoffman (USA.), Onno De Jong (Netherlands), Mordechai Livneh (Israel), Jim McQuillan (New Zealand), Mauro Mocerino (Australia), and Kay Stephenson (U.K.), chose the poster by **Jerika Shi** (age 10) of Saint Jude Catholic School, Manila, Philippines, as the winner in the younger age group for its striking colors, clear message, and good design (see reprint, top right). Three posters from the older age group were identified as exceptional: **Rosalyn Yu**, Philippine Tiong Se Academy, Manila, Philippines; **Maria Prasilova**, Slovak-English Bilingual School, Cadca, Slovak Republic; **Hsin-Wei Wang**, Taipei Municipal Chin-Hwa Junior High School, Taipei, Taiwan (see page 4). The winners received certificates of recognition and electronic devices such as hand-held game systems or MP3 players.

All winners and the 12 runners-up (see this page and pages 6-7) received certificates of recognition, signed by Marianne Cutler, director of the Science Across the World program, and Bryan Henry, IUPAC president.

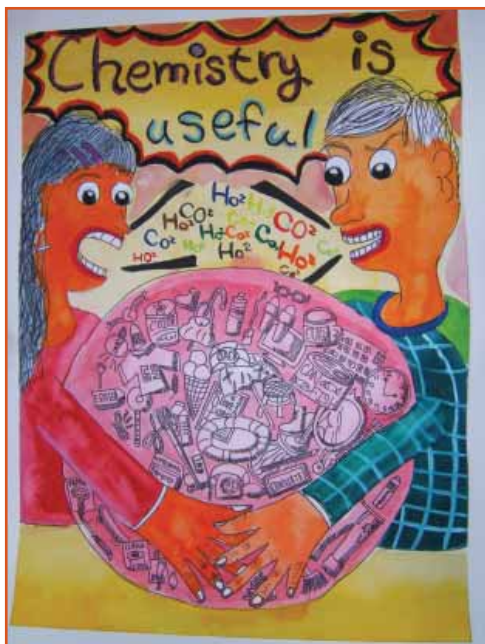


Jerika C. Shi (age 10), Philippines



Annie Chen (age 10), Taiwan

Lily Wang (age 13), Taiwan



Chemistry According to Kids



Feng Haochen (age 13) and Qin Zhiqiang (age 16), China



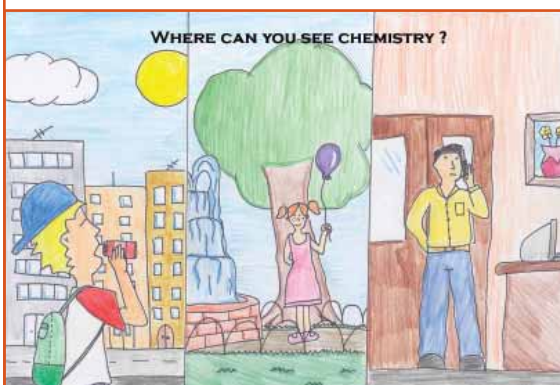
Jiang Huifan (age 14), China



Magy Ezzat Gaber (age 14), Egypt



Andrea Albu (age 14), Romania



Daniela Vilela Morimoto (age 16), Brazil

Poster Entries per Country

Country	Entries	Country	Entries	Country	Entries	Country	Entries
Argentina	40	Lithuania	7	India	3	Slovak Republic	7
Brazil	231	Macedonia	1	Indonesia	4	Taiwan	30
Bulgaria	11	Malaysia	18	Iran	107	Turkey	17
Canada	1	Mexico	8	Ireland	3	United Kingdom	192
Chile	48	Netherlands	1	Israel	1	USA	16
China	26	Philippines	8	Italy	6		
Dubai	2	Poland	19	Latvia	1	Total	944
Egypt	13	Portugal	9	Russia	12		
Hungary	18	Romania	44	Singapore	40		

The Challenging Process of Handling Electronic Submissions

SAW received electronic entries in many different languages, such as Chinese, Japanese, Russian, Bulgarian, and Arabic, which required downloading of special character sets before the files could be opened. Accompanying letters and e-mails were also sent in many different languages, the senders apparently sure that the staff of SAW could read "all" languages. One student filled his poster full of English text, commenting that everybody in the world should be able to read English and if not, could we provide them with dictionaries? The staff of SAW received entries from ages 7 to 20 and files up to 17.5 MB in formats they had never seen before. A few teachers told their students to write down the sources of the electronic images they used.

Chemistry According to Kids



Teams from Bulgaria (96 SOU "Lev Nikolaevich Tolstoy" in Sofia) and China (Zhanjiang Chinese-English School in Zhanjiang, Guangdong Province) collaborated on the best "international" poster.

Other teachers sent pictures of their students proudly displaying their posters. The receipt of entries from art teachers and art studios was very encouraging.

For more information about SAW, see July-Aug 2006 *CI*, p. 8. Details on this poster contest and more activities are also available on the SAW website.

Acknowledgements

The author would like to thank everyone who invested time one way or another in making this contest a success, including KCS, SAW, all the participants, the teachers, and the judges. A special thank you to Dr. Shu-Nu Chang from Aletheia University, Taiwan, who helped at the end by sending prizes and certificates to all the winners. 🍷

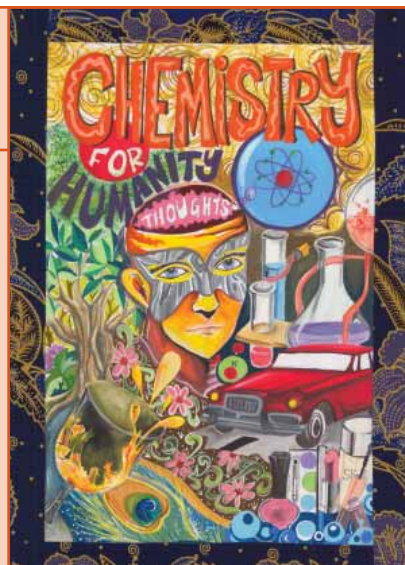
Lida Schoen <amschoen@xs4all.nl>, based in the Netherlands, is a titular member of the IUPAC Committee on Chemistry Education and the Subcommittee on the Public Understanding of Chemistry, and is a member of the Science Across the World team.

👉 www.scienceacross.org



Patrick Chen (age 14), Taiwan

Mary Ann Soheil Mansour (age 14), Egypt



Tok Wing Ten (age 16), Malaysia



Amanda Kaenzle (age 15), USA



A German Initiative for Start-Ups in the Life Sciences and Chemistry

by Uwe Gerlach

Science4Life started in 1998 with the idea of providing unique support for potential entrepreneurs in the life sciences and chemistry fields. Now, after eight years it has become an established institution and brand in the entrepreneurial scene. Science4Life is focused on two main activities: the annual business plan competition (Science4Life Venture Cup) and the expert and alumni network (Science4Life Business Forum).

The Science4Life business plan competition enjoys an excellent reputation and is firmly established in the start-up community throughout Germany, not only in the Federal State of Hesse where the competition started. In the eight years since it began, more than 350 business plans have been submitted, more than 200 companies have been founded, and, most important, more than 1600 highly qualified positions have been created. On 1 September 2006, the sponsors of this initiative, the government of the Federal State of Hesse and Sanofi-Aventis, launched the ninth round of this successful competition.

From Idea to Brand

In 1998, Science4Life was launched as a nonprofit organization with the aim of advising young German entrepreneurs in the life sciences and chemistry. In specific workshops and seminars, Science4Life advised these potential business founders about the complexities involved with starting a successful enterprise and establishing it on the market. The main goal was to help these start-up companies write a business plan that would convince investors to invest in their business.

Initially, the initiators of the program, the board of the German chemical and pharmaceutical company Hoechst and the Prime Minister of the Federal State of Hesse, together with the VCI (the German

Chemical Industry Association) and the DECHEMA (the German Society for Chemical Engineering and Biotechnology), were not confident that the idea to “support potential founders by an honorary operating network” would work. In addition, it was not known if there would be enough bold and intrepid entrepreneurs with appropriate ideas in Germany. Today, the former experiment can be viewed as a resounding success, not only in the Federal State of Hesse but also in Germany and beyond. Young founder teams from neighboring countries are also seeking the professional support of the initiative. In the recently completed eighth round of the Science4Life Venture Cup, eight business ideas from Austria, Canada, Hungary, and Switzerland were submitted.

Sponsors and Honorary Expert Network

Science4Life is now a registered society with its own committee. It is financed by the Federal State of Hesse and Sanofi-Aventis, Europe’s leading pharmaceutical company. More than 100 notable organizations support Science4Life and its unique focus on the life sciences and chemistry. Among them are pharmaceutical and biotech companies, law firms, consulting companies, banks and venture capitalists, as well as associations and scientific institutions like the German Chemical Society. Former participants and winners are involved as well. These network partners coach the participants and answer their questions at meet-



The winners of the 8th Science4Life Venture Cup, held in 2006, pose after the awards show in the Deutsche Bundesbank in Frankfurt am Main, Germany. In the middle is Dr. Frauke Petry, the happy first-prize winner, holding a check for over EUR 30 000.

ings, on the phone, or by e-mail. They also judge the business concepts in step one and the business plans in step two. Their support does not end with their participation in the Venture Cup, but continues in the huge and active alumni network of Science4Life. Answers to frequently-asked questions in the early stages of founding a company, such as how to protect intellectual property, or which legal form the company should take, can be found quickly within the network, and on the Science4Life website. In addition, the free Science4Life handbook is an invaluable source of information on writing a business plan.

Terms of Participation and Prize Money

Almost anyone who has an idea for a start-up company in the field of life sciences or chemistry can participate. Students, Ph.D. students and scientific co-workers at universities are just as welcome as entrepreneurs from industry. Due to the generous financial support of the two main sponsors and the voluntary work of the consulting experts, participation is free. The contributions range from scientific ideas to existing young enterprises. Participating start-ups may not be older than one year at the start of the new competition round. In addition to obtaining written feedback from experts, participants have the chance to win the EUR 30 000 first prize or a number of other prizes of the Science4Life Venture Cup, which has a total of EUR 72 500 in prize money available.

Of course, the prize money is not the only motivation. For many participants the main motivation is receiving advice and assistance from a network of high-level experts. The network provides high-quality consulting and intensive, informal contacts to scientific, technical, and industrial experts at virtually no cost. These experts pass on their knowledge to participants through written opinions, personal contacts, and useful tips for the development of a company.

Three Steps to the Venture Cup

The Venture Cup consists of three steps. In the first step, a concept is submitted, including an executive summary, describing the business idea, the team, and the market. In the second step, a complete business plan is submitted and evaluated by at least three jurors. Due to the different backgrounds of the various experts involved, both the technical and the economic parts are evaluated. It must be emphasized that with all of the detailed discussions and information transfer

involved, the sensitive data of the entrepreneurs are handled with complete confidentiality. All coaches and jurors have to sign a confidentiality agreement before they can review the ideas and business plans, which is a crucial point for these intellectual property-driven start-ups.

Step Three: Founder Workshop for the Top Five

During the third phase, the teams with the top five business ideas are selected to make presentations of their business ideas and concepts to a top-class jury from business, academia, and politics. Before the presentation, the teams attend a three-day workshop in which they learn about the many facets of being an entrepreneur. In intensive discussions with the expert network, participants learn to prepare for their customers and the capital market. Experienced consultants help put the finishing touches on the teams' presentations. The pressure and excitement mean that the teams hardly have time to enjoy the beautiful ambience of the hunting lodge in Rüdeshheim in the Rhine Valley where the workshop is held. Ultimately, it is the team with just the right mixture of technical facts, business knowledge, personal enthusiasm, and persuasiveness that can convince the nine-member jury.

Three Phases of the Science4Life Venture Cup 2007

Phase	Prize	Deadline
Phase 1—submission of the business concept	10 winners receive EUR 1 000, plus a one-day coaching session by experts in Berlin	7 February 2007
Phase 2—submission of the complete business plan	top 5 winners move to phase 3 6th–10th place winners receive EUR 1 500	4 May 2007
Phase 3—Founder Workshop and presentation to top-class jury	1st place: EUR 30 000 2nd place: EUR 15 000 3rd place: EUR 5 000 4th & 5th place: EUR 2 500	28 June–1 July 2007

The winner of this year's Science4Life Venture Cup was a team from Göttingen, Lower Saxony. Frauke Petry of PURinvent Limited, the first woman to head a winning team, convinced the jury with a chemical idea. The team's specially foamed polyurethane plastics, which consist of up to 50 percent water, have a number of potential applications thanks to its fire resistance.

Ideas for Products and Services from Many Regions

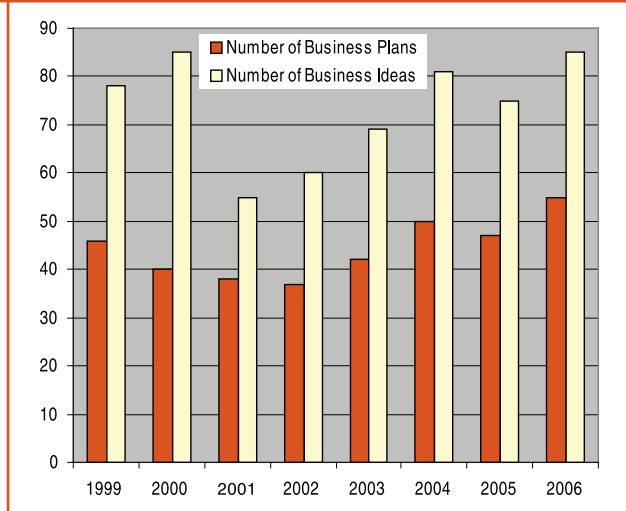
Of the 55 business plans submitted in 2006, 47 came from Germany and 8 came from abroad. A total of 42 product ideas with a focus on biotechnology, health care, medical technology, and chemistry were submitted. The remaining 13 business ideas address services, in which the focus was clearly on biotechnology and pharmaceuticals. In the years since the biotech bubble burst, the trend has been toward services among the start-ups participating in the Science4Life Venture Cup. Now, the trend is moving back to start-ups with product ideas.

Since 1998, when it began, participation levels in the Science4Life Venture Cup have been good. Last year, in the eighth round of the competition, a new record was set. The 55 submitted business plans represent a 10 percent increase compared to the previous top year, which was 2004. In addition, the 85 business ideas submitted in 2006 equals that of the stock market boom year of 2000. The difference between the number of business ideas and business plans arises because some teams choose to participate up to a certain phase of the competition. For example, a team with new, young ideas may only take part in step one, the concept phase. Existing companies with a mature business plan may choose to concentrate exclusively on step two of the competition, the business plan phase (see figure).

Highlights of Eight Years

Without a doubt, the highlights of the Science4Life Venture Cup are the winners of the competition over the last eight years. Following are some examples (also see table, p. 11):

N-Zyme BioTec GmbH, a spin-off from the Darmstadt Technical University and the Darmstadt Technical College in the Federal State of Hesse, was the first winner in 1999. With its range of services offered in the sector of tailor-made enzymes, particularly with biocatalysts for the food industry, the young team made an excellent impression. Remarkably, in 2003 N-Zyme BioTec GmbH achieved the breakeven point. Today, the company has around 20 employees. It is currently pursuing the proprietary development of recombinant proteins against diseases with orphan status, which have low numbers of patients in a population. To continue its expansion, the company is seeking venture capital.



Survey of eight years of the Science4Life Venture Cup: total number of submitted business plans and submitted business ideas.

Vasopharm GmbH was the winner of the Science4Life Venture Cup in 2000. From the beginning, the company, which is based in Würzburg, Bavaria, has focused on the diagnostics and modulation of the action of biological nitric oxide (NO). After starting with assays covering the entire NO signal cascade and its function, they switched towards the development of new therapeutics in this field. With 10 employees, and a close connection to the University of Würzburg Medical School, Vasopharm GmbH discovered a new approach to preventing life-threatening increases in intracranial pressure, which is now under development. So far, venture capital of more than EUR 18 million from seven investors has flowed into the company. In January 2006, Vasopharm GmbH acquired EUR 9.7 million in venture capital to proceed with the clinical development of its compounds. Among the investors are well-known companies like EMBL Ventures, the Venture Funds of the European Molecular Biology Laboratory in Heidelberg, Germany, and the globally active investor 3i.

Si4Health GmbH, the winner in 2004, has taken a totally different path to success. The company develops, produces, and markets cell scaffold materials for tissue engineering based on silicon, hence the "Si" in the company name. Since 2004, the company has undergone many changes. Still settled in the Biotechnology Park Regensburg in Bavaria, Germany, Si4Health GmbH has become part of a large company. The CEO of Si4Health GmbH met his future investor, Bayer Innovation GmbH, during the investment forum Seed4Money (see p. 11). The pharmaceutical

A German Initiative for Start-Ups

and chemistry company saw opportunities for a future business area in the innovative techniques of Si4Health GmbH.

Investment Forum Seed4Money and Capital Meeting Point

The economic environment is not the only thing that has changed since the start of Science4Life. The initiative itself always has to be flexible and creative in what it offers to its participants and alumni. For example, since 2002 the 5 winners of the competition and 10 more life sciences companies from Germany and neighboring countries have been able to present their companies in a 10-minute lecture to invited investors at the Seed4Money investment forum. This year, Seed4Money took place for the fifth time. Many agreements and financial contacts have been made during, and initiated by, Seed4Money. The next logical step was to bring this idea onto a web platform. A "capital meeting point" was created on the secure part of the Science4Life website. Here, former participants of the competition who are seeking capital can meet accredited investors. In this way, Science4Life tries to facilitate contacts between start-ups and venture capitalists at an early stage.



Science4Life Fair

The Science4Life Fair in April 2006 was a unique event for Science4Life. This was the first time that a German business plan competition organized a marketplace for former participants. During the event, more than 500 visitors met with more than 70 companies from seven Science4Life competitions in the Jahrhunderthalle in Frankfurt, to discuss their services and products and to make business contacts. In a special exhibition, 14 participants of the eighth round presented their ideas. The signal to all participants: Science4Life is an open, dynamic, future-oriented network for young entrepreneurs in the life sciences and chemistry.

Science4Life: A Success Story

Not even the initiators of Science4Life eight years ago could have foreseen its remarkable progress. What started as an idea has become a brand within the start-up scene in life sciences and chemistry in Germany and beyond. Former participants report that their participation, with the competent scientific and economic appraisal received, has been an advantage when dealing with future clients, cooperation partners and venture capitalists. Science4Life has become a recognized seal of quality in Central Europe.

continued on page 14

Science4Life Venture Cup Winners, 1999–2006

Year	Company	Location, Country	Field of Activity	Status Quo
1999	N-Zyme BioTec GmbH	Darmstadt, Germany	Tailor-made enzymes as bio-catalysts and therapeutics	20 co-workers, profitable
2000	Vasopharm GmbH	Würzburg, Germany	Development of new therapeutics and diagnostics for cardiovascular diseases	10 co-workers, venture capital financed
2001	Nanosolutions GmbH	Hamburg, Germany	Self dispersing nano particles for medical diagnostic and prevention of forgery	2005, patents taken over by another nanotechnology company
2002	WonDrug Biosciences GmbH	Marburg, Germany	New natural materials as therapeutics via bio-combinatorial analysis.	2004, taken-over by a US-company
2003	AlcaSynn Pharmaceuticals GmbH	Innsbruck, Austria	Development of new morphine derivatives	2006, majority acquired by an Austrian pharmaceutical company
2004	Si4Health GmbH	Regensburg, Germany	Novel cell scaffold materials for tissue engineering	2005, taken-over by a corporate venture company
2005	Inoviscoat GmbH	Köln, Germany	Multi coating technology for development of, e.g., band-aids with controlled release of drugs	3 co-workers, founded and financed
2006	PURinvent Limited	Göttingen, Germany	Elastic polyurethane with very high water content as insulating material and for fire protection	2 co-workers, founded

Building Research Capacity to Promote Innovation

A Case Study in Mauritius*

by Dhanjay Jhurry

In this knowledge era, the capacity of a country to foster innovation is a measure of the performance of its economy. Innovation is recognized to be closely associated with scientific and technological development. As nations struggle to achieve economic prosperity and gain leadership positions in the technology-intensive and competitive world marketplace, they transit through phases of “not yet scientifically developed countries” to “scientifically capable developing countries” and finally to “scientifically advanced countries.” The status of a country is determined by its levels of literacy, education, knowledge production and dissemination, advancement, and effective utilization of science and technology.

It is an alarming fact that the 4.8 billion people who live in developing and transition economies receive only 20 percent of global gross domestic product. A World Bank report (2002) warns that developing countries will have little success boosting economic growth and alleviating poverty unless they can close a growing knowledge or education divide between themselves and richer countries.

The irony of the knowledge society is the unwritten rule that its growth can only be fuelled by “knowledge,” which besides the bits and bytes, depends heavily on human resources. This puts countries such as India and China at a great advantage. Mauritius, which has limited human capital, has to plan properly so as to create maximum impact with less people. Mauritius aims at making a quantum leap from the low/medium technology manufacturing sectors, such as food, beverages, textiles, and clothing, to high-technology sectors such as information communications technology and pharmaceuticals.

To foster innovation in these high-tech sectors, the support and active involvement of academia, educational institutions, public and private sectors, industry and of all Mauritians at large are essential. But inno-

vation does not simply happen. It requires long-term and strategically directed investments in research, people, networks, equipment, and infrastructure. The transition time available to a country like Mauritius is relatively short and compressed as compared to those countries that took to the development trajectory much earlier. But scientists have the capacity to make a difference. Individual researchers and their institutions can do a lot to boost local R&D and industrial development and to create symbiotic relationships for global collaborative ventures.

How Are Research and Development Intertwined?

In the less developed and developing countries, research is hampered by a number of problems: funding constraints, inadequacy of laboratory equipment, lack of critical mass of researchers and trained technicians, lack of infrastructure, disconnection between university research and industry's needs, difficulty of commercialization of research findings, and lack of incentives (for example tax incentives) to promote private-sector research and development.

Mauritius is no exception. The University of Mauritius is gradually moving from a teaching institution to one actively engaged in research. Although its research performance is still relatively modest, it is by and large the leading research institution of the country. It is called upon to play a vital role in fostering innovation in Mauritius. The university has taken a number of measures to reinvigorate research. For instance, the research grants system has been restructured, financial support is now provided to enable researchers to participate in international meetings, and intellectual property rights management plans have been put in place. In order to enhance the university's participation in economic development, its research policy was recently changed so that it has a more strategic focus. With the creation of multidisciplinary centers of excellence, university research projects are now prioritized.

What is the Way Forward?

In the orchestration of a research program to foster innovation, a number of strategies had to be put in place. As depicted in the pyramid in figure 1, a multi-scaled approach was favored that took into account

* This article first appeared in *Conscientia*—the Eurekahub newsletter, July 2006 issue. Reproduced here with permission. For more information see <www.eurekahub.com>.

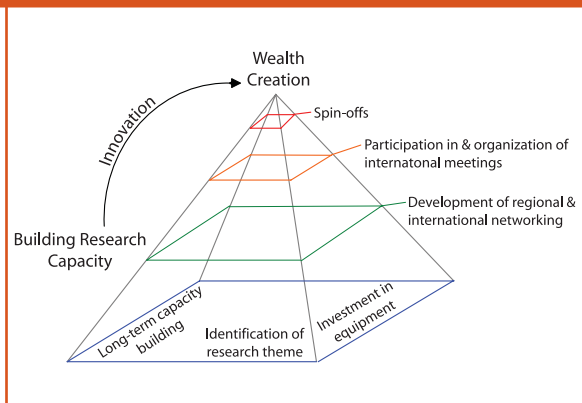


Figure 1: The pyramid of research capacity for wealth creation.

local, regional, and international dimensions.

It was first and foremost important to have a solid base with a well-defined research theme, whose development would depend on long-term investment in human resources and in equipment.

The central research theme developed by our group is the “Valorization of indigenous renewable resources.” This theme was selected to (1) ensure the advancement of knowledge, (2) relate research to the country’s needs by ensuring a mix of basic and developmental research, (3) ensure use of locally available resources, and (4) enable sustainable development.

Our research efforts have been mainly focused in the polymer field over a decade or so. However, one compelling idea to emerge under this new research paradigm is the development of a bio-based industry in Mauritius that would use renewable resources such as sugar feedstock or algae and seaweed. This idea ties in nicely with worldwide efforts to replace products derived from petroleum with those derived from sugars or carbohydrates. The bio-refinery concept, which is a facility that integrates biomass conversion processes and equipment to produce fuels, power, and chemicals, could be an attractive niche for Mauritius (see figure 2).

A research program can only prosper if supported by well-trained people. As Jawaharlal Nehru stated: “While it is relatively easy to put up a factory or a plant or a project, it is much more difficult, and it takes much more time to train the human being that will run a factory or a plant.”

It is noteworthy that we invested in education by introducing the first undergraduate course in polymer chemistry in 1995. The success achieved by this program prompted us to set up a postgraduate course in the field in 2000. This proved to be a key element

in attracting students to undertake research at the Masters and Ph.D. levels. To date, four students have attained Ph.D.s in the polymer field.

Development of a solid research program, especially in the chemical sciences, depends on access to sophisticated analytical instruments and equipment. Some nations have successfully set up regional centers with such sophisticated instruments, which cater to many research laboratories and university departments. In the Indian Ocean region, there are, unfortunately, no such centers even though some collaborations exist among universities. Through individual efforts and some local funding agencies, we have managed to secure funding to equip our laboratory with state-of-the-art facilities for chemical synthesis and characterization.

Infrastructure does not refer only to the provision of utilities such as water, electric power, gas and fuel, though these are vital and must be guaranteed and backed up. It also refers to the technical support in terms of trained personnel to run the facilities. This aspect of trained technical manpower has been addressed by our group by linking up with the Network of Users of Scientific Equipment of Southern and Eastern Africa (see NUSESA.org).

Development of Regional and International Networking

Networking of scientists and institutions within and across nations and continents is of paramount importance for the following reasons:

- interacting with peers for mentorship and guidance and to overcome intellectual vacuum
- acquiring support for the training of Ph.D.s, in terms of equipment and fund raising

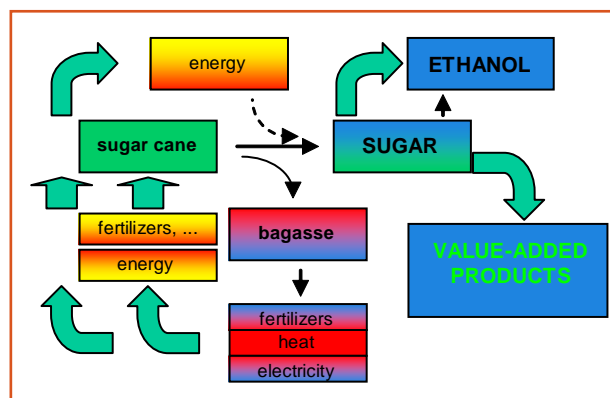


Figure 2: The bio-refinery concept.

In 2008, the International Conference on Chemical Education will take place in Mauritius—see announcement on page 35.

Building Research Capacity

- ensuring quality assurance
- achieving international recognition

We have set up quite successful exchange and twinning programs, both for researchers and students, with a number of foreign organizations in both English- and French-speaking countries.



Sugarcane and algae and seaweed are renewable resources available in Mauritius for the development of a bio-based industry.

Participation In and Organization of International Meetings

In June 2005, our Department of Chemistry hosted the 8th UNESCO School and IUPAC Conference on Macromolecules. This meeting attracted approximately 100 participants, including 70 from 17 foreign countries. Participants included high-caliber polymer scientists as well as young researchers and post-graduate students. The meeting gave young and more

experienced scientists from the large Indian Ocean region, including Australia, India, and Africa, the opportunity to present their research findings, to network, and to foster research collaborations between the north and the south, all in the pleasant and relaxed Mauritian environment.

Conclusion

Our group at the University of Mauritius is building research capacity as an asset for local and international companies willing to invest in bio-based industries, in particular. Taking this concept even further, why not create a center of research in Mauritius for the development of bio-based resources? Several such institutions of excellence have been opened in Southern nations through the collective efforts of consortia of Northern institutions. This idea is worthy of emulation. Such linkages breed research training and collaboration, and help in solving problems of local and global concerns. Unfortunately, a research center like this in Mauritius would not be possible without international support! 🏠

Dhanjay Jhurry <djhurry@uom.ac.mu> studied at Bordeaux University in France and completed his Ph.D. in polymer chemistry in 1992. He worked as an R&D chemist at Flamel Technologies in Lyon for three years before coming back to his native land of Mauritius. He has since been working at the University of Mauritius, where he is an associate professor of chemistry. His research interests include a mix of basic and developmental problems in the broad area of the chemical sciences of interest to Mauritius and the region. He has also a keen interest in fostering innovative capacity in Mauritius and has various responsibilities at the national level, including chairman of the Mauritius Accreditation Service Advisory Council, board member of the Food and Agricultural Research Council, and president of the Chemical Society of Mauritius, which is currently an Associate National Adhering Organization of IUPAC.

continued from page 11

Science4Life

Now, there are even participants from the USA. The Science4Life Venture Cup emerged as a contact point for Germans performing research in the USA who want to go into business for themselves. Participation and the appraisal of the business ideas by experts gives more security to those who are planning a start-up.

Everyone involved in this program, including the board of Science4Life and the sponsors, but also the many honorary experts from more than 100 compa-

nies, eagerly awaits the technical and entrepreneurial surprises that the next round of the competition will bring. The official start of the ninth Science4Life Venture Cup was 1 September 2006. The search for the best business ideas in the life sciences and chemistry for 2007 has begun. 🏠

Dr. Uwe Gerlach <info@science4life.de> is the project leader of Science4Life in Frankfurt, Germany.

Tools of the Trade

Evaluated Kinetic and Photochemical Data for Atmospheric Chemistry

by Michel J. Rossi

Atmospheric chemistry is the study of the complex network of thermal and photochemical processes occurring in the gas and condensed (cloud droplets, aerosol particles, ice crystals) phase as well as in multiphase processes. Chemical kinetic modeling is required to interpret observations in the field. This necessitates the availability of a robust, reliable, and regularly updated database of elementary reactions for use in chemical-radiative-transport models. Combustion chemistry and plasma processing for semiconductor applications require the same type of database.

Historical Background

In 1980, the original set of critically evaluated kinetic and photochemical rate parameters for atmospheric chemistry was published in the *Journal of Physical and Chemical Reference Data* by members of the CODATA Task Group on Gas Phase Chemical Kinetics under the auspices of the International Council of Scientific Unions. Cumulative updates were published in 1982 and 1984 as Supplements I and II, respectively. The original evaluation and Supplements I and II were primarily intended to furnish a kinetic database for modeling the chemistry of the middle atmosphere, which is between 10 and 50 km in altitude. In 1985, IUPAC set up a group to continue and enlarge upon work initiated by CODATA. The Subcommittee on Gas Phase Kinetic Data Evaluation for Atmospheric Chemistry was chaired by J. Alistair Kerr until the end of 1999. R. A. Cox took over the chairmanship thereafter. The subcommittee produced Supplements III, IV, and V in 1989, 1992, and 1997, respectively, which were all cumulative as they contained the complete but ever-increasing database that now mainly addresses the chemistry of the troposphere as well as the lower stratosphere. Supplement V included for the first time a database of heterogeneous chemical reactions.

After Supplement V it was no longer possible to cope with updating the very large number of chemical reactions involved in tropospheric chemistry. Therefore,

the subcommittee decided to limit Supplements VI, VII, and VIII, published in 1997, 1999, and 2000, respectively, only to a subset of the more than 700 gas phase and heterogeneous reactions comprising the database last presented in cumulative form as Supplement V. The database met the approval of the scientific community and the number of citations has grown steadily over the past 10 years, reaching 800 for Supplement IV published in 1992. In 2000, it was decided to change the mode of publication by setting up the database on the primary website associated with the Center for Atmospheric Chemistry at the University of Cambridge, UK, and a mirror site on the IUPAC server. This represented a break with long-standing tradition, and a radical change from the peer-reviewed system of publication in JPCRD.

Structure of the Database

The database is accessible free of charge at <www.iupac-kinetic.ch.cam.ac.uk>. It is broadly structured into Summary Tables for families of reactions, Data Sheets, and Supplementary Information.

- **The Summary Tables** display the recommended kinetic data. It has to be emphasized that this list comprises critically evaluated data—in contrast to a mere compilation of experimental kinetic data—that are organized into five categories of atmospherically relevant reactions. These also include photochemical reactions in each category:
 - (1) O_x , HO_x , NO_x , SO_x (inorganic) reactions
 - (2) organic reactions
 - (3) ClO_x reactions
 - (4) FO_x , BrO_x , IO_x reactions
 - (5) heterogeneous reactions

The tables are designed so that allow users can conduct a rapid survey, with the preferred value of the rate constant at 298K displayed, as well as the Arrhenius representation of its temperature dependence (if available), the relevant temperature range of validity, and the associated uncer-



Tools of the Trade

tainties. Past editions of the Summary Tables, starting with January 1999, are available to enable tracking of changes in the database over the years.

- **The Data Sheets** are brief summaries of available experimental data, with notes that provide details of the experimental procedures. For each thermal reaction a preferred value of the rate coefficient at 298K is given together with its temperature dependence, if available. The selection of the preferred value is discussed in some detail, and estimates of the accuracies of the rate coefficients and temperature coefficients have been given for each reaction depending on the number of studies and their quality. For each photochemical reaction, the data sheets list the preferred values of the photoabsorption cross-sections and the quantum yields of the photochemical reactions, together with comments on how these were selected. As of June 2006, a full list of 27 sets of data sheets are available representing just under 1000 reactions. Each individual data sheet may be downloaded as either a Adobe PDF document or Microsoft Word file for individual use.
- **Supplementary Information** given at the bottom of the homepage includes a brief guide to the data sheets comprising key definitions of kinetic parameters and a glossary of terms; an introduction to the heterogeneous data sheets; a reference list of thermodynamic data of relevant atoms, free radicals, and closed shell molecules; and the order of chemical reactions within a family.

In addition, the home page affords easy access to additional information, including recent changes (displayed in chronological order), a list of members (providing a way to get in touch with the evaluators), a sign-up form to join the mailing list, and a list of publications, including Supplements I to VIII published to date.

Converting an extensive database from a hard copy volume to a website comes at a price: the well-known volatility of the electronic record is somewhat opposed to the need for unflinching documentation that is the hallmark of serious scientific work. Just imagine a climate modeler 10 years from now who inquires about the exact time at which the value of a crucial rate constant was changed due to a change in recommendation! In addition to the historical record of past versions of the Summary Table (vide supra), the subcommittee

decided some time ago to take a “snapshot” of the kinetic database at a given moment in time by publishing subsets in the peer-reviewed literature. Three large subsets have already been published in electronic form in *Atmospheric Chemistry and Physics Discussions*, which provides the basis for the final hardcopy edition in *Atmospheric Chemistry and Physics*, two volumes of which have already been published, in 2004 (*Atmos. Chem. Phys.*, 4, 1461-1738) and 2006 (*Atmos. Chem. Phys.*, 6, 3625-4055).

Previously, the updating process of the database was conducted on a semiannual basis, but more recently this has occurred on a yearly basis. Updating involves intense discussions among members, and usually implies a meeting of the entire task group. The 32nd meeting of the group took place in June 2006.

Summary

The advantages of the kinetic database may be summarized as follows:

- extensive database, accessible free of charge
- critical evaluation as opposed to mere compilation of literature data
- rational path to recommended values based on highlighted experimental or theoretical values
- frequent updates
- hard copy “snapshots” of the state of the database at a given point in time for easier traceability of recommendation changes

Michel J. Rossi <michel.rossi@epfl.ch> is a professor at the Institut des Sciences et Technologies de l'Environnement of the Ecole Polytechnique Fédérale de Lausanne, in Lausanne, Switzerland. Over the last 10 years he has been actively involved in this project and related activities. Rossi is also involved in the IUPAC Physical and Biophysical Chemistry Division Committee and currently acts as vice president.



www.iupac.org/projects/1999/1999-037-2-100.html
www.iupac-kinetic.ch.cam.ac.uk

The **Tools of the Trade** series, coordinated by Kip Powell, past president of the IUPAC Analytical Chemistry Division, provides a forum for views and discussion on one of the Union's goals: “IUPAC will facilitate the advancement of research in the chemical sciences through the tools that it provides for international standardization and scientific discussion.” If you wish to contribute, please contact <kip.powell@canterbury.ac.nz>.

Greenhouse Gases—Mitigation and Utilization

Many governments struggle with the greenhouse gas (GHG) problem, trying to balance this long-term imperative with shorter-term economic needs, which are often more pronounced in developing nations. Industries seek ways to reduce their emissions, but are constrained by the lack of practical technology and clear government direction. The scientific community is making the GHG problem a major area of study. A conference has been planned that will bring all three of these groups together, to seek a broad mutual understanding of the current situation and clarity for future directions.

CHEMRAWN (Chemical Research Applied to World Needs) and the International Conferences on Carbon Dioxide Utilization will hold a combined conference that will cover the science and policy related to mitigation and utilization of CO₂ and other greenhouse gases. In addition, the conference aims to provide a broad mutual understanding of the current situation and clarity for future directions.

The meeting is being held six months before the Kyoto-protocol commitment period begins. Signatory governments are committed to meeting their targets within the 2008–2012 time period. However, many questions remain over how will this be achieved.

Scientists, engineers, and industrial or governmental policymakers are invited to participate in this conference, which will cover the following topics:

- the carbon balance in nature
- mitigation strategies
- government policy
- improved combustion processes
- capture of CO₂
- CO₂ sequestration
 - in terrestrial reservoirs
 - in deep seas
 - in soil and biomass
 - by carbonate formation
- mitigation of N₂O and methane

- utilization of CO₂
 - enhanced oil or gas recovery
 - methane recovery from hydrates
 - enhanced agricultural production
 - as a solvent or in CO₂-expanded liquids
- CO₂ as a feedstock
 - biochemical conversion
 - homogeneous catalysis
 - heterogeneous catalysis
 - photochemical or electrochemical conversion

The conference, organized jointly with the 9th International Conference on Carbon Dioxide Utilization, will be held **8–12 July 2007** at Queen's University in Kingston, Ontario, Canada. Information on the conference is available at www.chem.queensu.ca/greenhouse.

For more details, contact the Task Group Chairman Gary van Loon <vanloon@chem.queensu.ca>.

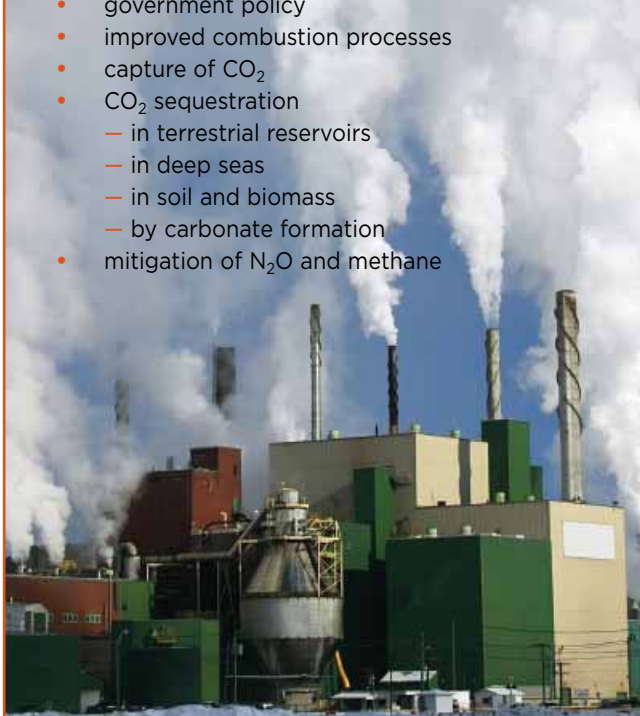
 www.iupac.org/projects/2006/2006-031-1-021.html

Liquid Intrusion and Alternative Methods for the Characterization of Macroporous Solids

Scientists working on porous materials, like adsorbents or catalysts (carbons, clays, silicas, aluminas, zeolite), first paid attention to their *micropores* (pore width smaller than 2 nm) and *mesopores* (width between 2 and 50 nm) since these are responsible for the high-surface area and enhanced surface properties of these materials. More recently, research focused on the optimization of these adsorbents (e.g, to produce oxygen or hydrogen or to recover solvents) or catalysts (like exhaust catalysts) has demonstrated the importance of hierarchical porous structures, including *macropores* (wider than 50nm), in speeding gas transport.

Currently, the most efficient method to characterize macropores in a broad size range is mercury-intrusion porosimetry. However, the everyday handling of mercury that is required raises serious health and environmental problems. Among the problems involved are inevitable spills and the need to recycle the mercury polluted by the sample. Hence, the objectives of this project are as follows:

1. To examine alternative *liquid intrusion* techniques (and others if possible) available to assess the



The Project Place

- pore-size of materials, with special attention to macropores.
2. To establish a *critical and comparative* appraisal.
 3. To assess the various procedures requiring mercury handling and recommend the safest practice.
 4. To publish the findings as an IUPAC Technical Report so it may be broadly disseminated in the corresponding scientific and technical communities. This will be accomplished with help from the equipment manufacturers who will be associated with the project.



Intruding mercury up to 400 MPa allows for the determination of pore width, from 3 nm to 100 μm , in rigid porous materials. The glass intrusion chamber (four different sample sizes are shown here) is to be filled with the sample and then with mercury before being inserted in the high pressure unit (here accommodating two chambers). After each experiment, the mercury spoiled with powder and oil (used to exert the pressure) needs to be cleaned and distilled.

The aim of this project is to provide a first step toward satisfactory answers, by listing, examining, and evaluating all trials conducted in the field. It will consider the intrusion of safer liquids (other molten metals, water, organics) and also the extension of the analysis of capillary condensation data up to the macropore range, which until recently was considered inapplicable. The need for improvements and/or alternative methods is urgent. By clarifying the situation, this project should help in the selection and development of more promising approaches. The issue concerns most scientists and industrialists working with porous materials, including catalysts, phar-

maceuticals, building materials, stones of ancient monuments to be restored or protected, adsorbents for chromatography, and liquid purification or gas separation.

For more information contact Task Group Chairman Jean Rouquerol <jean.rouquerol@up.univ-mrs.fr>.

 www.iupac.org/projects/2006/2006-021-2-100.html

Priority Claims for the Discovery of Elements with Atomic Number Greater than 111

by John Corish

Despite the fact that there are now 111 elements in the Periodic Table, the discovery and naming of a new member of this exclusive group is still seen as one of the most exciting events in the world of chemistry and indeed of science. The making of a new element requires very large and expensive facilities as well as expertise that now often involves international collaborative efforts. The two most recently named elements were made first at Gesellschaft für Schwerionenforschung (GSI) in Darmstadt, Germany. The additions of darmstadtium (110) and roentgenium (111) to the Periodic Table were formally approved by IUPAC in 2003 and 2004, respectively.

The process leading to the naming of a new element is the responsibility of the Inorganic Chemistry Division of IUPAC and is two fold. First, claims for its discovery are thoroughly examined by a Joint Working Party of experts appointed by the presidents of IUPAC and the International Union of Pure and Applied Physics (IUPAP). These experts examine claims submitted by laboratories to determine whether they fully meet the carefully laid-down criteria for the discovery of a new element [*Pure Appl. Chem.* 63(6), 879-886, 1991]. If the working party is satisfied that the criteria are met, then priority for discovery is assigned to the laboratory that submitted the claims. The second part of the process, in which the successful laboratory is invited to propose a name for the element, can then begin. New names are expected to fall within established guidelines [*Pure Appl. Chem.* 74(5), 787-791 (2002)] and are carefully examined by IUPAC experts and published for a period for public review, before

The Project Place

they are finally brought to the IUPAC Council for final approval. The sequence of events is set out in the diagram on the right.

An "Island of Stability" is predicted for elements with Atomic Numbers close to 118, and in recent years, many laboratories around the world have been actively trying to make elements approaching that number. As recently as October 2006, new reports of the making of element number 118 were widely published in the public press. (e.g., "Element 118, Heaviest Ever, Reported for 1,000th of a Second" *New York Times* 17 Oct. 2006, by James Glanz; "Element 118 Detected, With Confidence" *C&EN*, 17 Oct. 2006, by Mitch Jacoby)

So, are there new kids on the block? To answer this question, an IUPAC/IUPAP Joint Working Party, chaired by Paul Karol, is currently considering claims for the discovery of elements numbered 112, 113, 114, 115, 116, and 118, and is expected to report on these claims during the coming year. For more details, see project #2006-046-1-200.

 www.iupac.org/projects/2006/2006-046-1-200.html

New Element?



Analysis of the claim by IUPAC/IUPAP



Publication of the analysis in *Pure and Applied Chemistry*



Invitation of the credited group to propose a name



Provisional recommendation presenting the proposed name



Public review



Final approval by the IUPAC Council



Publication of the approved name in *Pure and Applied Chemistry*

Provisional Recommendations

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

 www.iupac.org/reports/provisional

Standard Definitions of Terms Relating to Mass Spectrometry

This document contains recommendations for nomenclature, definitions of terms, and acronyms in mass spectrometry. In 1974, the IUPAC Commission on Analytical Nomenclature issued recommendations on mass spectrometry terms and definitions. In 1978, the Commission on Molecular Structure and Spectroscopy updated and extended the recommendations and made further recommendations regarding symbols, acronyms, and abbreviations. The Physical Chemistry Division Commission on Molecular Structure and Spectroscopy's Subcommittee on Mass Spectroscopy revised the recommended terms in 1991 and appended terms relating to vacuum technology. Some additional terms related to tandem mass spectrometry were

added in 1993 and accelerator mass spectrometry in 1994. Due to the rapid expansion of the field, a further revision of the recommendations has become necessary.

Comments by 31 January 2007

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 www.iupac.org/reports/provisional/abstract06/murray_310107.html

Graphical Representation of Stereochemical Configuration (IUPAC Recommendations 2006)

Jonathan Brecher

Pure and Applied Chemistry

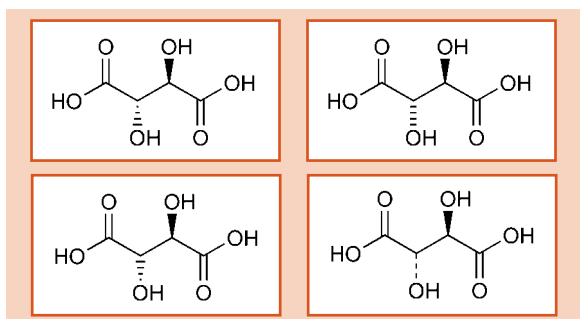
Vol. 78, No. 10, pp.1897–1970, 2006

doi:10.1351/pac200678101897

Stereochemical configuration is determined by the relationship of atoms in three-dimensional space, yet it is still most commonly represented in two-dimensional media such as printed publications or computer screens. This article provides recommendations for the display of three-dimensional stereochemical information in two-dimensional diagrams in ways that avoid ambiguity and are likely to be understood correctly by all viewers. Examples are provided for all types of stereochemical configuration, with explanations of which styles are preferred and which should be avoided. The principal recommendations of the article include:

- Know your audience: Diagrams intended for a wide audience should be drawn as simply as possible.
- Avoid ambiguous drawing styles.
- Avoid the use of perspective diagrams and class-specific drawing styles (Fischer projections, Haworth projections, etc.) when structures are to be interpreted by computers.
- Use solid wedges to indicate bonds that project above the plane of the paper and hashed wedges to indicate bonds that project below the plane of the paper; in both cases, the bonds must be oriented with the narrow end at the stereogenic center.
- Avoid connecting stereogenic centers with a stereobond.

 www.iupac.org/publications/pac/2006/7810/7810x1897.html



Want to find out why these diagrams are either preferred, acceptable, or simply not acceptable? Read the recommendations to find out.

Atomic Weights of the Elements 2005 (IUPAC Technical Report)

M.E. Wieser

Pure and Applied Chemistry

Vol. 78, No. 11, pp. 2051–2066, 2006

doi:10.1351/pac200678112051

The latest evaluation of atomic weight determinations and other cognate data has warranted 16 changes for the standard atomic weights of the elements, $A_r(E)$, from those published previously in the 2001 Table of Atomic Weights. The revised standard atomic weights are as follows: $A_r(\text{Al}) = 26.981\,5386(8)$, $A_r(\text{Bi}) = 208.980\,40(1)$, $A_r(\text{Cs}) = 132.905\,4519(2)$, $A_r(\text{Co}) = 58.933\,195(5)$, $A_r(\text{Au}) = 196.966\,569(4)$, $A_r(\text{La}) = 138.905\,47(7)$, $A_r(\text{Mn}) = 54.938\,045(5)$, $A_r(\text{Nd}) = 144.242(3)$, $A_r(\text{P}) = 30.973\,762(2)$, $A_r(\text{Pt}) = 195.084(9)$, $A_r(\text{Sm}) = 150.36(2)$, $A_r(\text{Sc}) = 44.955\,912(6)$, $A_r(\text{Na}) = 22.989\,769\,28(2)$, $A_r(\text{Ta}) = 180.947\,88(2)$, $A_r(\text{Tb}) = 158.925\,35(2)$, $A_r(\text{Th}) = 232.038\,06(2)$.

A recommendation is made that $\delta^{13}\text{C}$ values of all carbon-bearing materials be measured and expressed relative to Vienna Pee Dee Belemnite (VPDB) on a scale normalized by assigning consensus values of -46.6‰ to L-SVEC lithium carbonate and $+1.95\text{‰}$ to NBS 19 calcium carbonate.

 www.iupac.org/publications/pac/2006/7811/7811x2051.html

Terminology of Polymers Containing Ionizable or Ionic Groups and of Polymers Containing Ions (IUPAC Recommendations 2006)

M. Hess, R.G. Jones, J. Kahovec, T. Kitayama,

P. Kratochvíl, P. Kubisa, W. Mormann, R.F.T.

Stepsto, D. Tabak, J. Vohlídal, and E.S. Wilks

Pure and Applied Chemistry

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doi:10.1351/pac200678112067

This document defines the terms most commonly encountered in the field of polymers containing ionizable or ionic groups and polymers containing ions. The scope of the document has been limited to organic polymers. Inorganic materials, such as certain phosphates and silicates, which also may be considered ionic polymers, are excluded from the present document. The terms selected are those that are widely

used in the field of polymers containing ionizable or ionic groups and polymers containing ions. Only those terms that could be defined without ambiguity are considered. The terms are listed in alphabetical order, and cross-references to definitions given in other documents are provided.

 www.iupac.org/publications/pac/2006/7811/7811x2067.html

Cytokine Profiles in Human Exposure to Metals (IUPAC Technical Report)

Reinhild Klein, Michael Schwenk, and Douglas M. Templeton

Pure and Applied Chemistry

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doi:10.1351/pac200678112155

Cytokine production is altered in most, if not all, disease states. In disorders arising from human exposure to noxious substances, there is an extensive literature on the involvement of cytokines. Consequently, measurements of cytokines have been performed and their use propagated as a diagnostic procedure in a number of relevant disorders. In recent years, several methods and test kits have become available for cytokine measurement, including for studying allergic disorders where cytokines have been shown to play an important role. However, cytokine profiles in biological fluids are rather unstable, and are influenced by various exogenous and endogenous factors. Moreover, it has recently become evident that analysis of single cytokines in the blood has little diagnostic relevance.

Immunosensitization to metal ions through occupational and environmental exposure has been described in earlier papers from this project.* This paper discusses the possible role of cytokine profiling in demonstrating and understanding this phenomenon. The cytokines are a large family of polypeptides exerting autocrine, paracrine, and/or endocrine effects. They include interleukins (ILs), interferons (IFNs), and growth factors. They may be grouped as pro-inflammatory (e.g., IL-1, IL-6, IL-12, IL-18, TNF- α), anti-inflammatory (e.g., IL-10), or those regulating T-helper (TH) cell function. The latter are subdivided into those associated with TH1 (e.g., IL-2, IL-12, IFN- γ , TNF- β) or TH2 (e.g., IL-4, IL-5, IL-13) cell function. Because different types of immune reactions (e.g.,

immediate reaction vs. delayed-type hypersensitivity) differentially involve TH1 and TH2 cells, measurement of cytokine production in response to metal ions can potentially give insight into underlying immune mechanisms and responses.

The paper gives examples for species of Ni, Cr, Co, Hg, Cd, and Be; and in less detail for species of Fe, Pt, Pd, and Rh. Antibodies are available commercially that allow for the determination of many cytokines, and such measurements are most usefully performed with body fluids, supernatants from stimulated lymphocyte cultures, or lysates of lymphocytes or other biopsied cells. The predominant methods include enzyme-linked immunosorbent assay (ELISA) and flow cytometric measurement of the cytokine, bioassay of its activity in cell culture, and polymerase chain reaction (PCR) assessment of its mRNA level. In practice, levels of individual cytokines are highly variable between individuals, and reliable reference values are generally lacking. Ratios of cytokines are more informative than absolute concentrations, and biological variability in cytokine production dictates that repeated testing is necessary to confirm trends. Determining cytokine profiles is presently of questionable diagnostic utility in individual cases of metal sensitization, but is providing mechanistic insights in a research context.

*see <www.iupac.org/projects/1999/1999-047-1-700.html>

 www.iupac.org/publications/pac/2006/7811/7811x2155.html

Glossary of Terms Relating to Pesticides (IUPAC Recommendations 2006)

Gerald R. Stephenson, Ian G. Ferris, Patrick T. Holland, and Monica Nordberg

Pure and Applied Chemistry

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doi:10.1351/pac200678112075

This glossary contains definitions of more than 500 terms frequently used in relation to the chemistry, mode of action, regulation, and use of pesticides. A wide range of disciplines is involved in this field, and the glossary was developed as a step in facilitating communication among researchers, government regulatory authorities, and chemists in associated professional areas. The range of terms relates to pesticide

Making an imPACT

residue analysis, sampling for analysis, good laboratory practice, metabolism, environmental fate, effects on ecosystems, computer simulation models, toxicology, and risk assessment. The number of important, "pesticide-related" terms has more than doubled since 1996, when the first IUPAC glossary of this type was developed, an indication of how this field has become so integrated with many other scientific and regulatory disciplines.

 www.iupac.org/publications/pac/2006/7811/7811x2075.html

Education, Outreach, and Codes of Conduct to Further the Norms and Obligations of the Chemical Weapons Convention (IUPAC Technical Report)

Graham S. Pearson and Peter Mahaffy
Pure and Applied Chemistry
Vol. 78, No. 11, pp. 2169–2192, 2006
doi:10.1351/pac200678112169

The 2002 IUPAC evaluation of scientific and technological advances relevant to the operation of the Chemical Weapons Convention (CWC) included a recommendation that more education and outreach should be directed toward the worldwide scientific and technical community to increase awareness of the CWC and its benefits. In 2004, the president of IUPAC and the director-general of the Organization for the

Prohibition of Chemical Weapons (OPCW) agreed on a proposal for a joint project on chemistry education, outreach, and the professional conduct of chemists. This led to a joint IUPAC/OPCW international workshop held in Oxford, UK, from 9–12 July 2005, which attracted 27 participants from 18 different countries. This report sets out the background to the workshop, the scope of the presentations and discussions, the outcomes of the workshop, and the recommended steps to further chemical education, outreach, and codes of conduct in regard to the obligations of the CWC.

Among the key recommendations of the report are the following:

- Chemistry education for secondary and post-secondary students must address the benefits of science and technology using chemicals and the potential for misuse in regard to illicit drugs, chemical and biological weapons, persistent organic pollutants, etc.
- Chemists need to recognize their role in ensuring sustainable development, and that compliance and implementation of international treaties such as the CWC and the BTWC (Biological And Toxin Weapons Convention) contribute to sustainable development.
- OPCW needs to clearly endorse the education and codes initiative, which can be referred to by IUPAC National Adhering Organizations and Associate NAOs in approaching their respective National Authorities and other national ministries.

 www.iupac.org/publications/pac/2006/7811/7811x2169.html

Another IUPAC Initiative Relevant to the CWC

Impact of Advances in Science and Technology on the CWC

The objective of a recently initiated IUPAC project is to prepare an assessment of the impact of developments in science and technology on the operation of the Chemical Weapons Convention (CWC) as a contribution to the Second Review Conference of the CWC to be held in spring 2008. IUPAC is in a unique position to tap into a broad spectrum of scientific expertise through its divisions and constituent national chemical

societies and science academies. Based on the Bergen experience [project #2001-057-1-020], the project will provide valuable input for the review process of the Member States of the Organisation for the Prohibition of Chemical Weapons.

For more information contact the Task Group Chairman Leiv K. Sydnes <leiv.sydnes@kj.uib.no>.

 www.iupac.org/projects/2006/2006-036-1-020.html

Internet Connection

Web Glossaries the Wiki Way

by Kermit Murray

A wiki is a type of website that can be edited by visitors using only their web browser.¹ The name comes from the word “wiki-wiki” that means quick in the Hawaiian language and is an apt name for these sites that can be quickly and easily modified. Wikis are useful for collaborative document creation because the document viewing and editing are integrated on-line. In a typical wiki, a visitor to the website can edit a page by clicking on the appropriate link. The page content is edited in simple markup language and saved. The changes to the wiki are stored in a database on a webserver and are immediately visible to visitors; all of the pages on the wiki website are generated by the server using the information stored

in the database. Because it is so easy to change a wiki website, a record of all changes is also stored in the database so that older versions of the site’s pages can be restored.



The largest and most popular wiki is Wikipedia, a user-edited wiki encyclopedia.² In the summer of 2006, Wikipedia had nearly 5 million articles in more than 200 languages and was one of the top 20 most popular websites in the world. The Wikipedia site is open and any visitor can edit its content. The site is maintained by hundreds of volunteer users who oversee quality and consistency, moderate disputes, and guard against abuse. A recent investigation by the journal *Nature* found that Wikipedia was nearly as accurate as the peer-reviewed *Encyclopedia Britannica*.³ This success is offset somewhat by the ability of pranksters to disrupt the site and of the vocal and persistent to dominate discussion.⁴

A wiki website is an ideal format for content that consists of short entries on well-defined subjects—something found in encyclopedias and glossaries. Each entry is given its own page that can be linked to other pages and included in an overall list of terms. Pages can be tagged by one or more categories

and alphabetization and sorting is automatic. Wiki websites are potentially useful tools for collaborative development of glossaries of nomenclature and terminology that are often encountered in IUPAC projects. In a traditional wiki, such as Wikipedia, visitors can edit content. However, a wiki website can be set up for editing by registered users or by a few trusted users. In the early stages of a project, the wiki can be open for editing by all users. As the project progresses, access is limited to task group members and, once the glossary is complete, it is web accessible and archived with no further work necessary. This article describes a wiki that was used in conjunction with a project aimed at updating the glossary of terms for mass spectrometry.

A Wiki Glossary of Mass Spectrometry Terms

The IUPAC project on Standard Definitions of Terms Relating to Mass Spectrometry, (# 2003-056-2-500) was initiated in 2003 with the goal of updating mass spectrometry nomenclature (see provisional recommendations, p. 19). Recommendations on mass spectrometry terms had not been made in more than 10 years and there was a need to obtain high visibility and wide access so that the final updated list of terms gained wide acceptance in the community. There was also a need for discussion and input from the mass spectrometry and greater scientific community. All of these needs can be met with a wiki website.

The mass spectrometry (MS) terms website runs on a low bandwidth commercial host. It has the easy-to-remember domain name <msterms.com>. The MS terms webserver runs with the Linux operating system⁵ and the popular webserver program Apache.⁶ The server details are not important other than for the fact that this configuration is compatible with many freely available wiki server programs. The MS terms website uses open-source Mediawiki software,⁷ which was originally written for the Wikipedia website and is now maintained by the Wikimedia foundation and used for several of their projects. Mediawiki uses the programming language PHP to create webpages from data stored in a SQL database. Visitors to the website are not aware that the pages are created “on the fly.”

The screenshot image on page 24 shows an example page from the Mass Spectrometry Terms Wiki for the term “electron ionization.” The wiki software is designed for encyclopedia entries, thus each wiki page is called an “article.” This article contains the proposed

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definition of mass spectrometer, “The ionization of an atom or molecule by electrons that are typically accelerated to energies between 50 and 150 eV,” with supporting links specific to the term and general navigation tools that appear on each wiki page. All page content aside from the definition and the links are generated automatically and are the same for each page. The left side bar can be customized with links to other pages on the wiki and to outside sites, such as the IUPAC website. The

bottom of the page has copyright information and statistics and at the upper right of the page, a link for logging in the site. The top of the page has clickable tabs for the article (shown), discussion related to the article, editing the article, and the editing history of the article. Under the “History” tab, all prior versions of the article can be viewed and compared with each other or with the current version. Any previous version can be restored. The article can also be edited through the edit tag, which gives access to the material in the page below the words mass spectrometer.

Editing a wiki requires the use of a simple markup language that is similar to the hypertext markup language (HTML) used for most web pages. Examples of

The screenshot shows a wiki page titled "Electron Ionization". At the top, there are tabs for "action", "discussion", "edit", and "history". Below the title, there is a "PROVISIONAL RECOMMENDATION" section with the text: "The ionization of an atom or molecule by electrons that are typically accelerated to energies between 50 and 150 eV. The term *electron impact* is deprecated. This is a provisional recommendation for the term *Electron Ionization* from the Mass Spectrometry Terms and Definitions Project. If you would like to comment on this definition, please contact the Task Group members." Below this is a "Gold Book Entry" section with the text: "This is the term used to describe ionization of any species by electrons. The process may, for example, be written: for atoms or molecules: $M + e \rightarrow M^+ + 2e$ for radicals: $M + e \rightarrow M^+ + 2e$ The term 'electron impact' should not be used." There is also an "External Links" section with a link to "Wikipedia:Electron ionization" and a "Categories" section with "Final draft" and "ionization". At the bottom, it says "This page was last modified 14:18, 3 Aug 2006. This page has been accessed 2241 times. About Mass Spectrometry".

www.msterms.com/wiki/index.php?title=Electron_Ionization

wiki syntax are given in table 1 (note that some syntax is specific to Mediawiki). Like HTML, wiki markup is set up to make hierarchical outlines, lists, and links to other documents. The feature that sets it apart from typical web page markup is the ease of article-to-article links. In wiki markup, a link to an article is indicated by the article name within double square brackets. For example, in the electron ionization definition, the words “electron impact” are set in doubled brackets when shown in the edit window, and are rendered as a link to the electron impact article within the wiki. If the article does not exist, clicking the link leads the visitor to the edit page for the new article. Wikis are set up to create and link articles quickly.

Table 1: Wiki Syntax Examples

Format	Hypertext Markup	Wiki Markup
Bold	<code>This text bold</code>	<code>'''This text bold'''</code>
Heading Level 1	<code><h1>Level 1</h1></code>	<code>=Level 1=</code>
Heading Level 2	<code><h2>Level 1</h2></code>	<code>==Level 2==</code>
List	<code> Item 1 Item 2 Item 3 </code>	<code>*Item 1 *Item 2 *Item 3</code>
Linking	<code>IUPAC</code>	<code>[http://www.iupac.org/ IUPAC]</code>
Direct Linking	No equivalent	<code>[[Mass spectrometry terms]]</code>

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Some specific elements were developed for the mass spectrometry wiki. The blue banner box is a template that generates the same messages for each term and definition. Orange Book⁸ and Gold Book⁹ entries are included on the appropriate pages so that original and revised terms can be compared. External links to glossary entries and other information are also included on many pages.

Outlook

The Mass Spectrometry Terms Wiki has been highly successful and receives more than 5 000 page requests per day. Many of the glossary terms are top hits on popular search engine pages, making the site accessible to not only scientists but also to students and others in the general public. Much of the popular discussion of Wiki websites focuses on the relative utility of the open Wikipedia website compared to traditional encyclopedias. What is often forgotten is the fact that Wiki are useful and, true to their name, a fast and easy way to create websites. A Wiki can be open or closed to general editing, depending on the server configuration. The IUPAC website currently has hundreds of webpages devoted to glossaries, nomenclature, and other recommendations that could

benefit from formatting in the Wiki way. Projects that are being developed and are accepting comments can be open to allow broad and general input. Once public comments are closed, the wiki can be limited to access to all but task group members and, when the final recommendations are made, the site can be closed and maintained as an archive.

References

1. http://en.wikipedia.org/wiki/Ward_Cunningham
2. www.wikipedia.org
3. J. Giles, "Internet Encyclopaedias Go Head to Head," *Nature*, 15 December 2005: 900. doi:10.1038/438900a
4. S. Schiff, "Know It All," *The New Yorker*, 31 July 2006.
5. www.linux.org
6. www.apache.org
7. www.mediawiki.org
8. Inczédy, J.; Lengyel, T.; Ure, A. M. *Compendium of Analytical Nomenclature*; 3rd ed.; Blackwell Science, Ltd.: Oxford, UK, 1998.
9. McNaught, A.D.; Wilkinson, A. *Compendium of Chemical Technology*; Blackwell Science, Ltd.: Oxford, UK, 1997.

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 www.msterms.com



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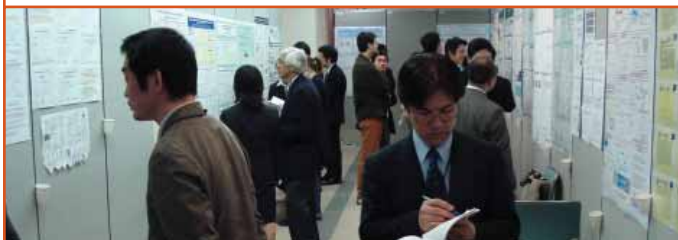
SEARCH

Conference Call

Photochemistry

by Masahiro Irie

The XXth IUPAC Symposium on Photochemistry was held in Kyoto, Japan, 2-7 April 2006. This series of symposia has been held every two years in Europe since it was initiated by the late George S. Hammond in 1964. This year marked the first time the symposium was held outside Europe. The symposium topics covered all fields of photochemistry, from inorganic, organic, and physical photochemistry to materials science, biological chemistry, and physics.



The opening presentation of the symposium was devoted to Hammond, who passed away in 2005 at the age of 84. David Whitten (University of New Mexico, USA) delivered the tribute, which focused on his personality and accomplishments in photochemistry. The scientific program was initiated by the plenary lecture of W.E. Moerner (Stanford University, USA) entitled "Single Molecules as Nanoscale Reporters in Biophysics, Chemistry, and Materials Science." Other plenary lectures were as follows:

- K. Müllen (Max-Planck-Institute for Polymer Research, Germany), "Nanoemitters by Design"
- P. Corkum (National Research Council, Canada), "Attosecond Imaging: Asking a Molecule to Paint a Self-Portrait"
- M. Blanchard-Desce (Université de Rennes, France), "Molecular Engineering of Two-Photon Absorbing Molecules for Bioimaging"
- M.A. Miranda (Universidad Politécnica de Valencia, Spain), "Drug-Biomolecule Interactions in the Excited States"
- N. Hoffmann (Université de Reims Champagne-Ardenne, France), "Efficient Radical Addition of Tertiary Amines to Alkenes Using Photochemical Electron Transfer"
- L. Jiang (Institute of Chemistry, China), "UV-Manipulated Switch between Superhydrophobicity and Superhydrophilicity"
- K. Domen (The University of Tokyo, Japan), "Overall Water Splitting on Non-Oxide Based

Photocatalysts"

- J. Mattay (Bielefeld University, Germany), "On the Way to Supramolecular Photochemistry at the Single-Molecule Level"

In addition, 16 invited lectures, 131 short oral contributions, and 462 posters were presented. Additionally, three workshops on "Organic Light Emitting Diodes," "Photoinduced Electron Transfer," and "Photocatalysts" were held. In the workshop on photoinduced electron transfer, a presentation on "Long-Lived Charge-Separated or Charge-Transfer States in Compact Dyads" by S. Fukuzumi (Osaka University, Japan) and J.W. Verhoeven (University of Amsterdam, Netherlands), proved to be very controversial and elicited extensive discussions. The two lectures attracted a large audience and aroused exciting arguments over the topic. The details of the symposium were fully reviewed by J. Mattay in *Ang. Chem. Int. Ed.* 2006, 45, 3570-3571 (doi: 10.1002/anie.200601561).

IUPAC Poster Prizes were awarded to the following three young scientists: Hisao Shimizu (Toyama University, Japan), Jong Won Chung (Seoul National University, Korea), and Adrian O. Chapman (University of Nottingham, UK).

Over 770 participants, including more than 200 from 38 different countries, contributed to a very successful symposium.

The next symposium in this series will be held in July 2008 in Göteborg, Sweden. The chairman is Devens Gust (Arizona State University, USA).

Masahiro Irie <irie@cstf.kyushu-u.ac.jp> is a professor of chemistry in the Department of Chemistry and Biochemistry at Kyushu University. He was the chairman of the International Scientific Committee of XXth IUPAC Symposium on Photochemistry.

Organic Synthesis

by Eusebio Juaristi and Roberto Melgar-Fernández

The 16th International Conference on Organic Synthesis (ICOS-16), sponsored by IUPAC, Academia Mexicana de Ciencias, the Division of Organic Chemistry of the American Chemical Society, and Sociedad Química de México, took place in Mérida, México, 11-15 June 2006. Six hundred attendees from over 40 different countries participated in the conference.

Continuing the success of previous conferences



Opening ceremony (L to R): Alfonso Larqué, director, Centro de Investigación Científica de Yucatán; Raymundo Cea, director, Instituto de Química, UNAM; Eusebio Juaristi, chairman of ICOS-16; Ing. Manuel Fuentes Alcocer, mayor of Mérida City; Eduardo González, Ministry of Health in the State of Yucatán; Leiv Sydnes, past president of IUPAC, Guillermo Delgado, president of Sociedad Química de México.

in this series, ICOS-16 secured the participation of eight outstanding plenary speakers: Luiz Dias (Brazil), Eric Jacobsen (USA), Paul Knochel (Germany), Shū Kobayashi (Japan), Stephen Martin (USA), Frank McDonald (USA), Joaquín Tamariz (México), and David MacMillan, winner of the 2006 Thieme-IUPAC Prize (see <www.iupac.org/news/archives/2006/thieme_prize.html>). Additionally, 15 renowned invited speakers delivered 25-minute presentations: Carsten Bolm (Germany), Margaret Brimble (New Zealand), Cathleen Crudden (Canada), Gregory Fu (USA), Tohru Fukuyama (Japan), Miguel García-Garibay (USA), Cesare Gennari (Italy), David Hodgson (UK), Minoru Isebe (Japan), Eun Lee (Korea), Shengming Ma (China), Carmen Nájera (Spain), Régis Réau (France), and Philippe Renaud (Switzerland).

In addition, 36 invited experts participated as speakers in six symposia in the areas of “medicinal chemistry” (chair, Tarek Mansour), “organocatalysis” (chair, Carlos Barbas, III), “enantioselective synthesis of β -amino acids” (chair, Ferenc Fülöp), “organolithium compounds in synthesis” (chair, William Bailey), “selenium and tellurium in organic synthesis” (chair, João Comasseto), and “applications of microwave in organic synthesis” (chair, Nicholas Leadbeater).

The next conference, ICOS-17, will be held 22-27 June 2008 in Daejeon, Korea. The co-chairs of the organizing committee are Sunggak Kim (KAIST) and Eun Lee (Seoul Nat’l Univ.). All correspondence should be sent to the secretary general Sung Ho Kang <shkang@kaist.ac.kr>.

Eusebio Juaristi <juaristi@relaq.mx>, chairman of ICOS-16, is a professor of organic chemistry in the Department of Chemistry at Centro de Investigación y de Estudios Avanzados del IPN, México. Roberto Melgar-Fernández is a graduate student at the same institution and was a member of the Organizing Committee.

Neurotoxic Metals

by Monica Nordberg and Roberto Lucchini

The IUPAC-sponsored international workshop on “Neurotoxic Metals: Lead, Mercury, and Manganese from Research to Prevention” took place in Brescia, Italy, as a satellite meeting of the 28th International Congress on Occupational Health (ICOH), held 17-18 June 2006. The workshop coincided with a celebration of the first 20 years of the Institute of “Medicina del Lavoro” of Brescia, which was the conference venue.

The Scientific Committee consisted of Lorenzo Alessio (Italy), Philippe Grandjean (Denmark), Anders Iregren (Sweden), Roberto Lucchini (Italy), Philip J. Landrigan (USA), Gunnar Nordberg (Sweden), and Monica Nordberg (Sweden). R. Lucchini acted as workshop organizer. The membership of the conference’s National Advisory Committee and Scientific Secretariat is available at <www.ntoxmet.it/organization.htm>.

Financial and other support was provided by IUPAC, ICOH, ISPESL (see <www.ispesl.it>), U.S. National Institute of Environmental Health Science, U.S. National Institute for Occupational Safety and Health, the University of Brescia, and the Province of Brescia. There was no registration fee for participants from countries with a per capita gross domestic product of less than USD 15 000.

The scientific background for the workshop is that the nervous system is an important target organ for toxic metals. These chemical substances tend to accumulate in the brain and cause long-term neurotoxic effects. The implementation of preventive programs in the workplaces has led to a decrease in occupational exposure to toxic metals, but environmental levels have increased, leading to a widening ubiquitous exposure. Given the increasing life expectancy and duration of working life, concern is growing about the possible long-term effects of metals such as lead, mercury, and manganese. New research has shown that adverse effects may occur at “low” exposure levels previously thought to be safe.

Further high-quality research on exposure-related health effects is necessary to allow governmental and regulatory agencies to institute preventive measures. This international workshop offered a unique opportunity for an exchange of information among researchers, risk assessors, regulatory bodies, public health authorities, and stakeholders.

Conference Call

All members of the Scientific Committee on the Toxicology of Metals (SCTM) and the Scientific Committee on Neurotoxicology and Physophysiology (SCNP) were invited to participate. A total of 110 participants—scientists, physicians, and others with an interest in the field—from 27 nations participated in the two-day workshop.

Declaration of Brescia

At the closing session of the International Workshop at Brescia, the following recommendations on the Prevention of the Neurotoxicity of Metals were adopted by consensus:

1. Intensified attention must be paid to early warnings of neurotoxicity.
2. All uses of lead, including recycling, should be reviewed in all nations . . .
3. In particular, tetraalkyl lead must be eliminated without delay from the gasoline supplies of all nations.
4. Current exposure standards for lead need urgently to be reduced.
5. Exposures of pregnant women and women of reproductive age to methyl mercury need to be reduced to prevent subclinical fetal neurotoxicity.
6. Exposures of pregnant women and young children to manganese need to be reduced to prevent subclinical neurotoxicity.
7. The addition of organic manganese compounds to gasoline should be halted immediately in all nations.
8. Exposure standards for manganese need to be reconsidered.
9. Economic impacts of the neurotoxicity caused by metals must be considered.
10. Need is great for continuing research into the neurotoxicity of metals.

See <www.ntoxmet.it> for full text.

The main topics of the workshop were preventative approaches to the three metals, previous experiences and future challenges, and economic implications of metal neurotoxicity. Topics of fundamental importance for risk assessment and prevention were highlighted in the following four sessions.

The session on **Lead**, chaired by Landrigan and Alessio, dealt with the history of lead use, discovery of subclinical toxicity, low-level lead toxicity, and lead and neurocognitive disease in the elderly. Special attention was paid to lead neurotoxicity in children, the threshold of low-level lead toxicity, and long-term effects of lead neurotoxicity in adults, including a presentation of the results of an Italian multicenter study.

The session on **Mercury**, chaired by G. Nordberg and P. Grandjean, covered mercury neurotoxicity, exposure

biomarkers for methylmercury, neurodevelopmental toxicity from Mediterranean seafood, inorganic mercury and neurotoxicity, neurophysiological evidence of methylmercury neurotoxicity, mechanisms of disposition of mercury, and exposure biomarkers for methylmercury.

The session on **Manganese**, chaired by D. Mergler and H. Roels, encompassed Mn in infants and mental deficiency, Parkinsonism from environmental exposure, Parkinsonism from welding operations, and manganese biomarkers for manganese exposure.

The session on **Manganese Risk Assessment**, chaired by M. Nordberg and A. Iregren, gave an overview of the current use of methylcyclopentadienyl manganese tricarbonyl in gasoline and a new Health Canada risk assessment for manganese.

The meeting started with welcoming addresses by the present chair of SCTM, M. Nordberg and the previous chair of SCNP, A. Iregren, and the dean of the School of Medicine at Brescia, Luigi Caimi. A selection of invited speakers was mixed with poster contributions. Some presentations dealt with other metals like arsenic. The scientific program started with a lecture by Alessio on "From Lead to Manganese through Mercury: Mythology, Science, and Lessons for Prevention." A complete list of speakers and presentations is available online.

At the end of the workshop, the international scientific committee proposed that the conference adopt a declaration based on the outcome of the meeting. After an extensive plenum discussion on the "Declaration of Brescia," (see box) a consensus was reached among participants that the proceedings should be submitted to ICOH and relevant international organizations and published in a scientific journal to educate the public about threats from toxic metals. The Declaration is now available on the conference website <www.ntoxmet.it> and will be published in a special issue of the *American Journal of Industrial Medicine*, along with selected papers from the NTOXMET workshop.

Monica Nordberg <monica.nordberg@imm.ki.se> was chairman of the ICOH Scientific Committee on the Toxicology of Metals. She is an associate professor at the Institute of Environmental Medicine, Karolinska Institutet, in Stockholm. Roberto Lucchini <lucchini@med.unibs.it> was chairman of the ICOH Scientific Committee on Neurotoxicology and Psychophysiology. He is currently at the Institute of Occupational Health at the University of Brescia, Italy.

Polymers Promoting Quality of Life

by *Jung-Il Jin*

MACRO 2006—the 41st World Polymer Congress was held in Rio de Janeiro, Brazil, 16–21 July 2006. The general theme of the congress was “Polymers—Promoting Life Quality.” This congress, chaired by Ailton de Souza Gomes, was the second organized by Brazilian polymer scientists. It occurred 30 years after the first, which was organized by Eloisa Biasotto Mano. More than 1100 scientists (42 percent Brazilian) from 49 countries participated in the conference and the total number of presentations, including posters, was slightly more than 1300 (35 percent Brazilian contributions).

There were 12 plenary speakers: 2000 Nobel Laureate Alan MacDiarmid, Paras Prasad, Louise Slade, James McGrath, Richard Gross, Jose' Carlos Pinto, M. Muthukumar, Yues Gnanou, Eishun Tsuchida, H.W. Spiess, Roeland Nolte, and Samuel Stupp. All gave

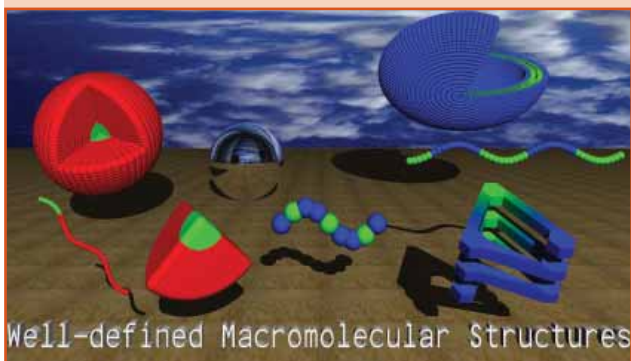
excellent talks and kept the large lecture hall packed every morning.

On most days there were 10 parallel sessions covering practically every aspect of polymer science. The Polymer Education and International Cooperation sessions provided an opportunity to discuss how IUPAC and the Polymer Division can and should be involved in this issue. The Samsung-IUPAC Young Polymer Scientist Award was given to **Greg Tew** of the University of Massachusetts, USA (see box) for his brilliant effort in bridging polymer science with biological problems. Mr. Hong-Shik Ko, president of the Samsung-Total Co., participated in the award ceremony. The IUPAC poster prizes were awarded to Ja-Hyoung Ryu (Yonsei University), Hitoshi Tanaka (Tokushima University), and Youngmin You (Seoul National University).

Jung-Il Jin <jijin@korea.ac.kr>, president of IUPAC's Polymer Division, served as the IUPAC Representative at MACRO 2006. Jin is currently in the Department of Chemistry at Korea University, College of Sciences.

Greg Tew earned his B.S. in chemistry from North Carolina State University in 1995 and his Ph.D. in 2000 from the University of Illinois-Urbana, where he studied under Prof. Sam Stupp. His work on self-assembling rod-coil molecules lead to an understanding of the important molecular structures and association energies governing nanostructure formation. While in graduate school, he received the Beckman Research Fellowship and American Chemical Society Organic Division Fellowship in 1998 and 1999, respectively. After graduating, he spent one year in Prof. William DeGrado's laboratory at the University of Pennsylvania studying biomimetic principles. This work led to two publications and the formation of a new company, PolyMedix. In 2001, he began a faculty position at UMass and since then has received a number of prestigious awards, including the highest honor given by the federal government to young investigators, the Presidential Early Career Award for Scientists and Engineers, which he received in 2004.

<www.pse.umass.edu/tew>



Biodiversity and Natural Products

by *Michio Murata*

Biodiversity in metabolites has been providing chemists with a great number of research targets. Natural products chemistry in Japan has a long and diverse history and plays a central role in the development of biological and biomedical molecular sciences. **The ICOB-5 & ISCNP-25 IUPAC International Conference on Biodiversity and Natural Products**, held 23–28 July 2006 in Kyoto, Japan, was chiefly organized by three scientific societies that represent different disciplines: The Chemical Society of Japan; The Pharmaceutical Society of Japan; and Japan Society of Bioscience, Biotechnology, and Agrochemistry. The organizing committee, headed by Daisuke Uemura of Nagoya University, consisted of scientists from all over Japan in the field of biodiversity and natural products-related chemistry.

Approximately 1200 participants from 32 nations attended the symposium, which was held at Kyoto International Conference Hall. The scientific program comprised around 600 poster presentations and 94 lectures. Information on the 17 plenary lectures can be found at <www.tennenyuuki.ne.jp/iupac>. While this symposium has been held biennially in various

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countries, this was the third time it was held in Japan, following meetings in 1964 and 1988.

As evidenced by the presentations and discussions at the conference, natural products chemistry and biodiversity chemistry have made great progress.



The conference should provide the foundation for new trends and facilitate the growth of young scientists who will be future leaders in these fields. As shown in the conference logo,

harmony between society and natural products chemistry and biodiversity chemistry has been embodied to a great extent. Following are the main topics covered at the conference:

- Isolation and Structure Elucidation of Natural Products
- Synthesis of Natural Products and their Models
- Biosynthesis and Genetic Engineering on Natural Products
- Spectroscopy in Natural Products Chemistry
- Molecular Mode of Action on Natural Products and Drugs
- Chemical Biology and Related Areas
- Chemistry and Biochemistry Related to Biodiversity
- Drug Discovery and Developments

The Program Committee selected the following three scientists for the IUPAC poster prizes:

- Kazuma Murakami (Kyoto University, Japan), "Formation and Stabilization Mechanism of the β -Amyloid Radical"
- Ken Ohmori (Tokyo Institute of Technology, Japan), "Convergent Approach to Oligocatechins Based on the Flavonoid-Sugar Analogy"
- Michael V. Perkins (Flinders University, Australia), "Total Synthesis of Auripyron A"

The next conference, ICOB-6 & ISCNP-26, will be held in Canada in 2008. Russell Kerr of Florida Atlantic University will be the chair of the conference.

Michio Murata <murata@ch.wani.osaka-u.ac.jp> served as secretary general of the conference. He is currently a professor in the Department of Chemistry, Graduate School of Science, Osaka University.

Pesticide Chemistry

by Ken Racke

The 11th IUPAC International Congress of Pesticide Chemistry was held 6–10 August 2006 in Kobe, Japan. This long-standing conference was established more than 40 years ago, and the meeting in Kobe marked the first return to Japan since 1982. The congress was organized under the auspices of the IUPAC Division on Chemistry and Environment (VI) and the Pesticide Science Society of Japan (PSSJ), and the meticulous planning and flawless execution were in large measure due to the strong leadership provided by key members of PSSJ, including Organizing Chairman Hideo Ohkawa, Organizing Vice-Chairman Isao Ueyama, PSSJ President Ken Umetsu, Scientific Committee Chairman Hisashi Miyagawa, and Chief Secretariat Mitsuru Sasaki.



Ken Racke

More than 1100 chemists from 52 countries participated in the congress, which was organized around the theme "Evolution for Crop Protection, Public Health, and Environmental Safety." The core of the scientific program consisted of welcoming speeches on behalf of PSSJ and IUPAC, 5 keynote addresses, more than 100 invited lectures, and nearly 600 posters. All the traditional technical strengths of past congresses were well represented by posters and lectures distributed among such main topics as new chemistry, natural products, biopesticides and transgenic crops, mode of action and resistance, environmental chemistry and analysis, metabolism and toxicology, and risk assessment and regulation. The broad range of interests was exemplified by the topics selected for the keynote addresses:

- James Collins, DuPont, USA, "Challenges and Opportunities in Crop Protection over the Next Decade"
- Kenji Mori, University of Tokyo, Japan, "Searching for Environmentally Benign Methods for Pest Control—Reflections of a Synthetic Chemist"
- Shivaji Pandey, FAO, Italy, "Hunger and Malnutrition Amidst Plenty—What Must be Done?"
- Yang Yongzhen, Institute for the Control of Agrochemicals, Ministry of Agriculture, China, "The Current Status of Pesticide Regulation and Management in China"

Conference Call

- Ken Racke, IUPAC, USA, "Safety Assessment and International Trade Implications of Pesticide Residues in Food"

The value of the conference's large poster sessions was enhanced by the organization of 15 topical poster workshops during which selected poster authors were invited to briefly note major points of their research, following which an open discussion occurred. The innovative nature of the research and high quality of the poster presentations was recognized through a series of gold, silver, and bronze awards that were presented across three categories. In addition, a special poster award recognizing outstanding research in scientifically emerging countries was presented for each of the three categories. The Poster Award Committee was chaired by John Unsworth of the IUPAC Division VI Advisory group on Crop Protection Chemistry and included several members of the Division VI Committee. Financial sponsorship for the poster awards was provided by Bayer CropScience. Gold award winners received an IUPAC certificate and a 100 000 Yen prize. The top awardees and their poster topics are listed below:

- Naoya Ichimaru, Kyoto University, Japan, "Alacacetogenins Are a New Class of Inhibitors of Mitochondrial Complex I"
- Neil Millar, University College of London, UK and Zewen Liu, Nanjing Agricultural University, China, "A Nicotinic Acetylcholine Receptor Point Mutation Conferring Insecticide Resistance Causes Reduced Agonist Potency to a Range of Neonicotinoids"
- Yumi Akiyama, Hyogo Prefecture Institute of Public Health and Environmental Science, Japan, "Multiresidue Analysis of 500 Pesticides in Agricultural Products Using GC/MS and LC/MS"

One innovation incorporated into the programming for Kobe involved 28 seminars organized around luncheons (18) or dinners (10). Each of these one-hour sessions was sponsored by a company, government institute, or scientific association that provided a meal to participants and organized a lecture, discussion, or demonstration topic of their choosing. Between 100 and 240 individuals attended each seminar and the events were quite popular among the attendees, both for the interesting technical aspects and free meals. The topics of these sessions were as diverse as the hosting organizations, and examples of sponsors included the Fraunhofer Institute, Sumitomo



Gold medal poster winner Neil Millar offering his thanks on behalf of all awardees. Poster Award Committee Chair John Unsworth of IUPAC is at the far right.

Chemical, Immunochemical Society of Japan, IUPAC, and the U.S. Department of Agriculture.

Pesticide chemistry plays an important role in crop protection and agricultural production. This role has been the foundation for many of the main topics that have comprised the IUPAC Congress of Pesticide Chemistry over the years. As reflected by the conference theme, the Kobe Congress organizers also chose to emphasize the role and importance of pesticides in public health protection and disease vector control. Lecture and poster sessions were organized around the topic of vector control chemistry, and a poster workshop discussion was devoted to the specific topic of mosquito control. A luncheon seminar featured Pierre Guillet, director of the World Health Organization's Global Malaria Program, who explained the increasingly important role of insecticide-treated bednets.

In addition to the academic research community, government regulators and industry were also well represented in the congress program. For example, invited lecturers included top regulatory officials from the Japan Ministry of Health, Labor, and Welfare; Japan Ministry of Agriculture, Fisheries, and Forestry; U.S. EPA Office of Pesticide Programs; Chinese Ministry of Agriculture; German Office of Consumer Protection; and Thailand Ministry of Public Health. Industry participation was strong via the technical program of lectures and posters, a healthy commercial exhibition (56 booths), and luncheon and evening seminars. As part of the technical program, a "Research Director Forum" was also organized that focused on industrial R&D success stories and future directions for crop protection chemistry. This first-ever event for the congress series began with short speeches by each of the VP-research directors of the most important agrochemical companies (Bayer, BASF, Dow, DuPont, ISK, Sumitomo, and Syngenta) and was followed by a lively panel discussion.

The Congress organizers made unique efforts to educate the broader public regarding crop protection chemistry and its value to modern society.

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Approximately 370 members of the public, consumer groups, and news media participated in an open seminar (in Japanese), which featured Masuru Kitano of Meiji University and emphasized the role and importance of contemporary pesticide technologies. Members of the news media were invited to the opening ceremonies and a subsequent press conference that featured key members of the organizing committee. As a result of these efforts, public awareness of the IUPAC Congress and the importance of pesticide chemistry were raised through several feature articles that appeared in Japanese newspapers and a report on the morning news of Japanese TV station NHK.

IUPAC members played important roles in the planning and execution of the congress, and served prominently on the Congress Advisory Board and the Scientific Program Committee, as session chairs, and invited lecturers. The IUPAC poster awards recognized outstanding poster contributions. An IUPAC booth was developed for the exhibition to display informational materials and highlight crop protection chemistry-related projects. Two IUPAC projects that are nearing completion sponsored seminars as a means of disseminating conclusions and recommendations. These included a seminar on "Global Availability of Information on Agrochemicals¹ and a seminar on "Impact of Transgenic Crops on the Use of Agrochemicals and the Environment."² The IUPAC Division of Chemistry and the Environment helped fund the attendance of chemists from scientifically emerging countries.

Further information on the recently concluded congress, including abstracts and a colorful newsletter that was published each day of the congress (The Kobe Gazette), is available via the congress website at <www.iupac2006.jtbcom.co.jp>. The Congress proceedings, to include keynote addresses and invited lectures, will be produced by Wiley-VCH, with a target publication date of March 2007. The 12th IUPAC International Congress of Pesticide Chemistry is being organized in cooperation with the Royal Australian Chemical Institute for July 2010 in Melbourne, Australia. Information on future plans will be available at the congress website <www.raci.org.au/iupacipc2010>.

IUPAC Project References

1 John B. Unsworth, <www.iupac.org/projects/2001/2001-022-1-600.html>

2 Gijis A. Kleter, <www.iupac.org/projects/2001/2001-024-2-600.html>

Ken Racke <kracke@dow.com>, a global regulatory leader with Dow AgroSciences in Indianapolis, Indiana, USA, is president of the IUPAC Division of Chemistry and the Environment.

Chemistry Education for Humanity

by Morton Z. Hoffman

The 19th International Conference on Chemical Education (ICCE) was held 12–17 August 2006 at Sookmyung Women's University in Seoul, Korea. The conference, which had as its theme "Chemistry and Chemistry Education for Humanity," attracted more than 300 participants from 36 nations. It was organized by a committee headed by Conference Chairman Jung-Il Jin and Organizing Committee Chairman Choon H. Do.

Along with IUPAC, the Korean Chemical Society (KCS) cosponsored the conference as part of its 60th anniversary celebration and in recognition of 2006 as the Year of Chemistry, as declared by the Korean government.

The conference featured a number of very distin-

CCE Directions and Priority Areas

- To foreground the importance of a learner-centered chemistry curriculum, both in the developed and developing world. The extent to which this is done should be one criterion used to assess educational projects.
- To give priority to initiatives that highlight the relationship between chemistry and sustainable development, consistent with the goals of the UN Decade for Sustainable Development.
- To continue to support initiatives that highlight ethical concerns in chemistry, including the collaboration that has developed between IUPAC and OPCW (Organization for the Prohibition of Chemical Weapons).
- To target CCE initiatives toward increasing the public understanding of chemistry. By working closely with COCI and other IUPAC Divisions, CCE plans to obtain broad approval for, and implementation of, a CCE report proposing a niche for IUPAC in the public understanding of chemistry.
- To continue support of the biennial International Conferences on Chemical Education (ICCE), which are flagship activities for CCE. We seek to more fully integrate ICCE activities into the work of CCE and use ICCE conferences to report the outcomes of CCE projects and bring participants together to implement CCE strategies.
- To build chemistry education networks, using fully the multicultural competence within CCE.
- To articulate clear directions for the Chemistry Education for Development subcommittee, and include the Flying Chemist Program as an integral part of the work of that subcommittee.

Please direct comments/questions to CCE Chairman Peter Mahaffy <peter.mahaffy@kingsu.ca>.

Conference Call

guished chemists and educators as plenary lecturers. Following are a few examples:

- Peter Atkins (UK), "The Challenge of Education"
- Aaron Ciechanover (Nobel Laureate, Israel), "The Ubiquitin Proteolytic System: From Basic Mechanisms through Human Diseases and onto Drug Targeting"
- Onno De Jong (The Netherlands), "Making Chemistry Meaningful: Conditions for Improving Context-Based Chemistry Education"
- Ann Nalley (president of the American Chemical Society, USA), "Applications of Computer Molecular Modeling in Teaching Organic Chemistry"
- Viktor Obendrauf (Austria), "More Small-Scale Hands-on Experiments for Easier Teaching and Learning"
- Su-Moon Park (Korea), "Chemistry Education for More Chemistry Majors"
- Bassam Shakhashiri (USA), "Enlightenment, the Responsibilities of the Enlightened, and Exhortations for Good Teaching"

KCS President Eun Lee gave welcoming remarks and opened the conference. Among the many topics covered at the conference were the following:

- public understanding of chemistry
- the role of chemists
- inorganic chemistry
- multimedia and visualization
- teacher education
- women and chemistry
- green chemistry
- microscale laboratory techniques
- instructional strategies
- experiments and demonstrations

In total, more than 300 presentations were made, including 120 posters, many of which were offered by elementary, middle, and high school teachers. Further details of the program are available on the ICCE 2006 website at <www.19icce.org>.

Three IUPAC Poster Prizes were awarded to the following individuals:

- Yoon-Ki Kim (Korea), "Analysis of Science Teachers' Views on Philosophy of Science"
- Marie H du Toit (South Africa), "Preparing Teachers for Reform—Chemistry Teacher Education: Teaching Chemistry Through Workshops for Teachers—A Report on a Successful Program"
- Mauro Mocerino (Australia), "Preparing Teaching Assistants for First Year Chemistry Laboratories"

One outstanding part of the conference program was the exhibit of posters by school children on the theme "Chemistry for Humanity." These posters were the winning entries from an international contest organized by Science Across the World, the IUPAC Committee on Chemistry Education, and the Korean Chemical Society. The exhibit showcased 13 posters from age group 10–13 and 41 posters from age group 14–16. The winners were chosen from 945 entries from 32 countries. Coverage of the competition appears on pages 4–7 of this issue of *CI*.



Conference organizer Choon Do and Lida Schoen (CCE and SAW) stand near the poster display in the conference hall. See more on page 4.

The ICCE was also the venue for the annual meeting of the IUPAC Committee on Chemistry Education (CCE). Chaired by Peter Mahaffy (Canada), CCE consists of eight titular members, eight divisional representatives, and about 20 national representatives. The committee approved the minutes of its meeting in Beijing in August 2005, received the minutes of the CCE strategy meeting in Puerto Rico earlier in 2006, and heard reports from the following subcommittees: Development of Materials for Raising Awareness about the Chemical Weapons Convention (see *imPACT*, p. 22), Public Understanding of Chemistry, Chemistry for Development, Microscale Group, and DIDAC. The chairman also reviewed the committee's objectives for the coming years (see box on page 32). CCE received an update on the Bologna process in Europe and the development of the EuroBachelor degree in chemistry. CCE will meet next in Torino, Italy, in August 2007, at the IUPAC General Assembly.

The 20th ICCE will be held 3–8 August 2008 in Pointe aux Piments, Mauritius (see page 35).

Morton Z. Hoffman <hoffman@chem.bu.edu> is a professor at Boston University, Massachusetts, USA, and is U.S. National Representative to the IUPAC Committee on Chemistry Education.

Where 2B & Y

Medicinal Chemistry

8-11 July 2007
Istanbul, Turkey

The **6th International Medicinal Chemistry Symposium** (AIMECS 07), organized by the Asian Federation of Medicinal Chemistry, will be held in Istanbul, Turkey, from 8-11 July 2007. The previous five symposia were held in Tokyo (1995), Seoul (1997), Beijing (1999), Brisbane (2001), and Kyoto (2003).

Symposium organizers, the European Federation of Medicinal Chemistry, and the American Chemical Society's Division of Medicinal Chemistry are working together to gather medicinal chemists from all over the world to participate in this world summit in Istanbul, the city that bridges Asia and Europe.

AIMECS 07 will focus on the design, discovery, and development of new pharmaceuticals and novel bioactive molecules. The symposium will include individual sessions on chemistry, pharmacology, drug

metabolism and toxicology, physiology for pharmaceuticals, as well as cheminformatics, bioinformatics, and other important topics on drug discovery and development.

Selected topics to be covered include chemistry for pharmaceuticals, new drug targets, ADME/Tox (absorption, distribution, metabolism, elimination, toxicology), new methods for drug discovery, predictive in silico methods, protein-protein interactions, natural products in drug discovery, recent approaches in anti-cancer therapy, biomarkers in HTS (high throughput screening) through clinical development, intellectual property and regulatory affairs, reversal of multi-drug resistance, and recent innovations in the development of anti-tumor natural products.

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

 www.aimecs07.org

Plasma Chemistry

26-31 August 2007
Kyoto, Japan

The **International Symposium on Plasma Chemistry** (ISPC) is a bi-annual international conference with topics encompassing the entire spectrum of plasma chemistry and plasma processing science. The 2007 symposium will be held 26-31 August in Kyoto, Japan. An industrial workshop will be held 31 August on environmental issues. The IUPAC summer schools, which will be held 23-25 August, will be devoted to thermal, cold (non-equilibrium), and atmospheric pressure plasmas.

The symposium will be organized around plenary lectures, invited and contributed oral presentations, poster sessions, and special panel discussions and oral sessions. All areas of plasma processing will be covered from thermal to non-equilibrium plasmas, as well as from fundamentals to applications and engineering.

Contributions are being solicited in application areas such as biomaterials, environmental, waste treatment, protective coatings, dielectric barrier

discharges, plasma coating, cutting/welding, micro-electronics, and all other areas of modern plasma application.

In the area of professional recognition, three Best Paper Awards will be selected and presented to young scientists on the basis of the scientific relevance of their contributions. In addition, the Plasma Chemistry Award, which recognizes lifetime achievements in the area of plasma chemistry and plasma processing, will be awarded at the symposium. The Board of Directors of the International Plasma Chemistry Society will select the winner. Nominations should be submitted to Board Chairman Jean-Michel Pouvesle, <jean-michel.pouvesle@univ-orleans.fr> of the University of Orleans, France.

Important Deadlines:

Paper submission: 13 April 2007

Registration with reduced fee payment: 30 April 2007

Final registration and hotel reservation: 20 July 2007

See **Mark Your Calendar** on page 37 for contact information.

 <http://plasma.kuee.kyoto-u.ac.jp/ispc18>

Chemical Education

3-8 August 2008
Mauritius

The **20th International Conference on Chemical Education** (20th ICCE) will be held 3-8 August 2008 at Le Méridien hotel in Mauritius. It is sponsored and financially supported by IUPAC and the IUPAC Committee on Chemistry Education.

The Organizing Committee would like to invite all academicians, science teachers, and researchers to attend this biennial meeting. The Organizing Committee has adopted the theme “**Chemistry in the Information & Communications Technologies Age**” in line with the worldwide trend in science and technology development.

The program will feature a wide variety of plenary, invited, and contributed lectures, as well as poster sessions. This conference will provide a platform for participants to share and discuss new ideas, techniques,

and strategies for involving students in the active learning of chemistry. As an innovative feature for the 20th ICCE, we are planning to have presentations in either English or French. Furthermore, there will be a virtual conference and a satellite meeting in Nairobi, Kenya. Selected papers will be published in chemical education journals after peer review.

The conference provides an excellent opportunity for participants to visit the island of Mauritius, famous for its sun, sea, and sand. There are many airlines connecting Mauritius and the rest of the world.

Important Deadlines:

Proposal for workshop: 31 December 2007

Abstract submission: 31 March 2008

Early registration: 30 April 2008

 www.uom.ac.mu/20icce.htm

Renewable Energy

18-21 June 2007
Mauritius

The ICSU Regional Office for Africa and the Mauritius Sugar Industry Research Institute (MSIRI)/University of Mauritius, in collaboration with the AU, UNECA, NASAC/AAS/TWAS and UNESCO, are organizing an international field workshop on the utilizations of renewable energy in Africa. “**Renewable Energy for Sustainable Development in Africa**” will be held 18-21 June 2007 in Mauritius. This four-day event includes a two-day technical session (oral and poster presentations) and a two-day field excursion to sugar plantations and electricity plants in Mauritius.

Africa is endowed with enormous untapped and under-utilized energy resources of all varieties, including classical energy sources—coal, gas, oil, nuclear—and renewable resources—biofuels, hydro, geothermal, solar, wind, and ocean energy. Energy is at the core of socio-economic development and environmental protection for each nation and every community. It has been estimated that about 75 percent of the sub-Saharan population has no access to electricity, especially in rural areas where over 70 percent of the population of this region lives. This lack of access to

electricity has impeded development on the continent and it is clear that the realization of the Millennium Development Goals depends on reliable and affordable energy supplies. Therefore, a field workshop will be devoted to the assessment and subsequent utilization of renewable energy as a supplement to and/or alternative source of energy in Africa.

Major Topics for Discussion

- the science and technology of renewable energy
- evaluation of Africa's renewable energy sources
- national/regional policies and legal frameworks on renewable energy
- development of human capacity in the energy sector in Africa
- power generation from renewable energy sources: investment opportunities

The workshop will include presentations by distinguished invited speakers, oral and poster presentations of selected papers, an exhibition, and field excursion.

All correspondence should be sent to: ICSU Regional Office for Africa

Email: j.chantson@icsu-africa.org or secretariat@icsu-africa.org

Fax: +27(0)12-481-4273,

2007

 IUPAC poster prizes to be awarded

1–2 March 2007 • Clinical Laboratory • Barcelona, Spain

Fourth European Symposium on Clinical Laboratory and In Vitro Diagnostic Industry

Dr. Josep M. Queralto, Hospital de la Santa Creu i Sant Pau, Servei de Bioquímica, Av. S. Antoni M. Claret, 167
Barcelona, 08025, Spain, Tel.: +34 932919022, Fax: +34 932919196, E-mail: jqueralto@santpau.es

11–14 March 2007 • Heterocyclic Chemistry • Gainesville, Florida, USA

8th Florida Heterocyclic Conference

Prof. Alan R. Katritzky, University of Florida, Dept. of Chemistry, Gainesville, FL 32611-7200, USA,
Tel.: +1 352 392 0554, Fax: +1 352 392 9199, E-mail: katritzky@chem.ufl.edu

15–21 April 2007 • Phosphorus Chemistry • Xiamen, China

17th International Conference on Phosphorus Chemistry

Prof. Yufen Zhao, Xiamen University, Department of Chemistry, Xiamen, China 361005, Tel.: +86 5922185610,
Fax: +86 5922186292, E-mail: yfzhao@xmu.edu.cn

16–20 April 2007 • Polymer Characterization • Rio de Janeiro, Brazil

POLYCHAR-15—World Forum on Advanced Materials and Annual Tutorial on Polymer Characterization

Prof. Elizabete F. Lucas, Institute of Macromolecules, Federal University of Rio de Janeiro, Rio de Janeiro, CT J
21945-970, Brazil, Tel.: +55 21 25627033, Fax: +55 21 22701317, E-mail: elucas@ima.ufrj.br

21–25 May 2007 • Mycotoxins and Phycotoxins • Istanbul, Turkey

XIIth International Symposium on Mycotoxins and Phycotoxins

Dr. Hamide Z. Senyuva, Tubitak-Atal, Konya Yolu No. 67, Besevler, 06530, Ankara, Turkey,
Tel.: +90 312 2124620/ext.14, Fax: +90 312 2123749, E-mail: hamide.senyuva@tubitak.gov.tr

10–14 June 2007 • Macromolecules • Brooklyn, New York, USA

IUPAC and ACS Conference on Macromolecules for a Sustainable, Safe, and Healthy World

Prof. Christopher K. Ober, Dept. of Materials Science & Engineering, Cornell University, 310 Bard Hall, Ithaca, NY,
USA 14853-1510, Tel.: +1 607-262-9108, Fax: +1 607-255-6575, E-mail: cober@ccmr.cornell.edu

26–30 June 2007 • Advanced Materials • Kharkiv, Ukraine

Modern Physical Chemistry for Advanced Materials (MPC'07)

Prof. Yuriy Kholin, Materials Chemistry Department, V.N. Karazin Kharkiv National University, Svobods Square 4,
Kharkiv 61077, Ukraine, Tel.: +380 57 707 51 26, Fax: +380 57 705 12 61, E-mail: kholin@univer.kharkov.ua

8–11 July 2007 • Medicinal Chemistry • Istanbul, Turkey

6th AFMC Medicinal Chemistry Symposium (AIMECS 07)

Prof. Ismail Yalcin, Faculty of Pharmacy, Ankara University, Ankara, TR-06100 Turkey, Tel.: +90 312 223 92 53,
Fax: +90 312 223 69 40, E-mail: yalcin@pharmacy.ankara.edu.tr

8–12 July 2007 • Greenhouse Gases • Ontario, Canada

CHEMRAWN XVII and ICCDU-IX Conference on Greenhouse Gases—Mitigation and Utilization

Dr. Gary van Loon, Department of Chemistry, Queen's University, Kingston, ON K7L 3N6, Canada,
Tel.: +1 613-533-2633, Fax: +1 613-533-6669, E-mail: vanloon@chem.queensu.ca

15–20 July 2007 • Heterocyclic Chemistry • Sydney, Australia

21st International Congress of Heterocyclic Chemistry

Dr. Kate Jolliffe, School of Chemistry, The University of Sydney, Sydney NSW 2006, Australia,
Tel.: +61 2 9351 2297, Fax: +61 2 9351 3329, E-mail: jolliffe@chem.usyd.edu.au

16–20 July 2007 • Solution Chemistry • Perth, Australia

30th International Conference on Solution Chemistry

Prof. Glenn Hefter, School of Mathematical and Physical Sciences, Murdoch University, Murdoch, WA 6150
Australia, Tel.: +61 8 9360 2226, Fax: +61 8 9360 1711, E-mail: g.hefter@murdoch.edu.au

22–27 July 2007 • Novel Aromatic Compounds • Awaji City, Japan

12th International Symposium on Novel Aromatic Compounds (ISNA-12)

Prof. Yoshito Tobe, Division of Frontier Materials Science, Osaka University, Toyonaka, Osaka University, Japan,
Tel.: +81 6 6850 6225, Fax: +81 6 6850 6229, E-mail: tobe@chem.es.osaka-u.ac.jp

2-6 August 2007 • Organometallic Chemistry • Nara, Japan

14th International Symposium on Organometallic Chemistry Directed Towards Organic Synthesis (OMCOS-14)

Prof. Koichiro Oshima, Department of Material Chemistry, Graduate School of Engineering, Kyoto University, Kyoto-daigaku katsura, Nishikyo-ku, Kyoto 615-8510, Japan, Tel.: +81-75-383-2437, Fax: +81-75-383-2438, E-mail: oshima@orgrxn.mbox.media.kyoto-u.ac.jp

4-12 August 2007 • IUPAC 44th General Assembly • Torino, Italy

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

5-11 August 2007 • IUPAC 41st Congress • Torino, Italy

Chemistry Protecting Health, Natural Environment, and Cultural Heritage
E-mail: IUPAC.2007@unito.it <www.iupac2007.org>



26-31 August 2007 • Plasma Chemistry • Kyoto, Japan

18th International Symposium on Plasma Chemistry

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2-7 September 2007 • Ionic Polymerization • Kloster Banz, Germany

International Symposium on Ionic Polymerization

Prof. Axel Müller, MC II/NW II, Universität Bayreuth, D-95440 Bayreuth, Germany, Tel.: +49 921 553399, Fax: +49 921 553393, E-mail: ip07@uni-bayreuth.de

23-28 September 2007 • Transactinide Elements • Davos, Switzerland

Third International Conference on the Chemistry and Physics of the Transactinide Elements (TAN'07)

Prof. H.W. Gäggeler, Paul Scherrer Institut, Radio- und Umweltchemie, CH-5232 Villigen, Switzerland, Tel.: +41 (0)56 310 24 01, Fax: +41 (0)56 310 44 35, E-mail: heinz.gaeggeler@psi.ch

23-28 September 2007 • Mendeleev Congress • Moscow, Russia

XVIII Mendeleev Congress on General and Applied Chemistry

Prof. Natalia P. Tarasova, D. Mendeleev University of Chemical Technology, Miuskaya Square, 9, RU-125047 Moscow, Russia, Tel.: +7 495 9732419, Fax: +7 495 2004204, E-mail: tarasnp@muctr.edu.ru

1-3 October 2007 • Systems for Energy Conversion • Moscow, Russia

International Conference and Exhibition "Molecular and Nanoscale Systems for Energy Conversion"

Prof. Sergey Varfolomeev, Emanuel Institute of Biochemical Physics, Russian Academy of Sciences, Kosygin St. 4, Moscow 119991, Russia, Tel.: +7 495-137-6420, Fax: +7 495-137-4101, E-mail: sdvarf@sky.chph.ras.ru

17-21 October 2007 • Novel Materials • Shanghai, China

3rd International Symposium Novel Materials and their Synthesis (NMS-III)

Prof. Yuping Wu, Department of Chemistry, Fudan University, Shanghai, 200433 China, Tel.: +86 21 55664223, E-mail: wuyup@fudan.edu.cn

An up-to-date calendar for 2007 and later years is available online at <www.iupac.org/symposia>.

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In 2006, 15 conferences and 13 National Adhering Organizations offered more than 60 posters prizes—testament to the growing interest in this program, which has only run for the last three years. With the increase in poster prizes awarded, more young scientists are becoming aware of IUPAC and its activities, while increasing the prestige and international visibility of the conferences and national meetings. The complete listing of 2006 IUPAC Poster Prizes Recipients is available online at <www.iupac.org/news/archives/2006/2006PosterPrizes.html>.

IUPAC Poster Prizes can be awarded at division- or standing committee-sponsored events. These events are flagged in the previous calendar pages. In addition, National Adhering Organizations also have the option to choose national meetings at which prizes will be awarded; the corresponding 2007 calendar is available online only at <www.iupac.org/symposia/nao/2007.html>.

For more information on the IUPAC Poster Prizes, please visit <www.iupac.org/news/archives/2004/poster_prizes.html>.