

Conference Call

Chemical Thermodynamics

by **Andrey Ya. Borshchevsky** and
Svetlana S. Melkhanova

The **Russian International Conference on Chemical Thermodynamics (RCCT-2005)** was held at Moscow State University from 27 June to 2 July 2005. This international meeting covered new developments in physical chemistry, including general topics of chemical thermodynamics, individual substances, solutions and melts, heterogeneous systems, and complex thermodynamic systems. RCCT-2005 attracted 476 participants from 27 different countries. The meeting was held under the auspices of IUPAC, the Russian Academy of Sciences, and the D.I. Mendeleev Chemical Society. The scientific program embraced all aspects of modern chemical thermodynamics. Among the 15 plenary lectures were the following:

- "Thermodynamic Approaches in Material Chemistry," Y.D. Tretyakov (Moscow State University, Russia)
- "Lattice Vibration and Phase Transition of Quasicrystals and the Related Crystals," A. Inaba (Osaka University, Japan)
- "Thermodynamic Properties and Phase Equilibria of Alloy Systems Relevant for Lead-Free Soldering," H. Ipser, H. Flandorfer (University of Vienna, Austria)
- "The Swelling of Nonionic and Ionic Arcylamide Hydrogels in Aqueous Solutions," G. Maurer (University of Kaiserslautern, Germany)
- "Technical Features and Unique Features of the Modern Heat Flux DSC," J. Schawe, S.V. Averkiev (Mettler Toledo GmbH, Switzerland)
- "Thermodynamic Modeling of Multicomponent Ionic Melts," S.A. Degterev (École Polytechnique de Montréal, Canada)

- "A New Field of Modern Thermodynamics—Nonequilibrium Nondissipative Thermodynamics," Ji-Tao Wang (Fudan University, China)
- "Progresses in Polymer Thermodynamics by Scanning Transitiometry," J.P.E. Grolier (Blaise Pascal University)

In addition, 155 oral and 488 poster contributions were presented in five parallel sessions. About 100 participants also took part in two round-tables: "Nanothermodynamics" and "Development of Thermochemistry in M.V. Lomonosov Moscow State University."

During the closing ceremony, doctorate awards, sponsored by Elsevier, were presented by the International Association of Chemical Thermodynamics to Alexey Popov (Lomonosov State University, Moscow, Russia) and Giuseppe Lazzara (University of Palermo, Palermo, Italy).

The conference program was released in the form of a book of abstracts (two volumes) and also on CD. Publications related to the conference will appear in a special issue of the *Russian Journal of Physical Chemistry*. The next conference in this series will be held in July 2007 in Suzdal, an inviting historical town situated about 400 km east of Moscow. Prof. Yuri Tretyakov is chair of the conference. See www.isc-ras.ru/RCCT2007 for details.

Dr. Andrey Ya. Borshchevsky <borsch@phys.chem.msu.ru>, vice chair of the conference, is a professor in the Chemistry Department of Moscow State University.

Polymers for Advanced Technologies

by **György Bertalan**, **György Marosi**,
and **Andrea Toldy**

The **8th International Symposium on Polymers for Advanced Technologies (PAT) 2005**, held in Budapest, 13–16 September 2005, was organized by the Budapest University of Technology and Economics, and under the auspices of IUPAC, the European Polymer Federation, Society of Polymer Science Japan, Chemical Society of Japan, Polymer and PMSE Divisions of the American Chemical Society, Budapest University of Technology and Economics, and Hungarian Academy of Sciences.

More than 350 active participants attended the conference, among them experienced researchers and



The head of the thermochemistry lab of Moscow State University, Prof. Lev N. Sidorov (center), with a group of students who assisted with organizing the conference.

younger scientists, leading specialists in various domains of the polymer industry, and student representatives of numerous universities.

The scientific program consisted of eight plenary and 44 invited lectures, about 120 oral presentations, and about 140 posters. The presentations covered not only the cutting edge and new trends in contemporary technological methods, but also basic research on new processes. Particularly emphasized were various methods of polymer synthesis that result in special architecture. The oral presentations were organized into four sections, covering the major domains of polymer technology:

- Section A — Advanced Macromolecular Syntheses/Structures
- Section B — Advanced Multicomponent Systems, Nanocomposites
- Section C — Electro-Optical and Other Advanced Technologies
- Section D — Biomedical Application, Biodegradation

The plenary lectures were devoted to cutting-edge and contemporary topics related to a number of advanced polymer technologies, as well as associated basic research. Topics included water purification through plastic optical fibers, nanostructured polymer materials created via atom transfer radical polymerization (ATRP) grafting or inclusion of nanotubes, and the use of photo- and thermally sensitive polymers as templates and surface patterning components. Prof. J. Economy cited a U.S. intelligence report that states that by the year 2015, water—not energy or food—will become the major problem resource in the United States and throughout the world. A number of new systems for trace-contaminant removal were described (e.g., new and improved high-surface-area adsorbent polymer fibers designed to remove trace contaminants to below 1 part per billion). Prof. P. Hodge addressed the theoretical and technological aspects of ring-chain equilibria, including an introduction to entropically-driven ring-opening polymerization (ED-ROP), discussing the useful features of ED-ROPs, the preparation of macrocyclic oligomers,



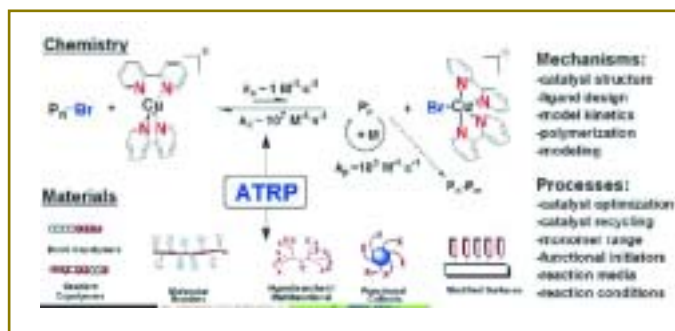
Menachem Lewin (left), the honorary chairman of PAT—founder of the PAT Symposium and the PAT journal—received a ZEMPLÉN award from Prof. György POKOL (Dean of the Faculty of Chemical Engineering of Budapest University of Technology and Economics) for propagation of the results of international and Hungarian science.

and possible practical applications. Prof. K. Matyjaszewski spoke on recent polymer syntheses using ATRP of acrylates, methacrylates, styrenes, acrylamides, acrylonitrile, and many other vinyl monomers to create polymers with a large range of molecular weights and with low polydispersities.

A discussion of the development of plastic optical fiber materials (POF) was presented by Prof. Y. Okamoto. POF has been increasingly applied to computer LANs. Along with several other advantageous properties, the elastic moduli of POF are typically many times lower than those of silica. Prof. B. Voit gave an especially interesting presentation demonstrating the applica-

bility of photo- and thermally labile polymers for template formation and surface patterning.

Section A of the oral presentations included discussions on a wide range of contemporary synthesis methods. Various basic materials were used for synthesis, including naturally occurring polymers (W.H. Daly), novel block copolymers (R. Faust), functionalized polymers (F. D'Agosto), nanocomposites, nanoparticles, biodegradable polymers, charge-transporting polymers, polymers used for biomacromolecular engineering, smart amphiphilic, and polymer networks.



Chemistry, mechanisms, materials synthesized, and processes arising from ATRP, as presented by Prof. K. Matyjaszewski.

Section B included presentations on a large variety of multicomponent polymer systems, their processing, properties, and applications. Several presentations

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devoted to the structure-properties relationship elucidated not only the functional modification of composites, but also the role of surface and interface modification. Presentations covering the use of nanocomposites as fire retardants represented another significant aspect of Section B. An important phenomenon, the migration of clay and structural changes in nanocomposites occurring upon annealing at elevated temperatures, was discussed by Prof. M. Lewin.

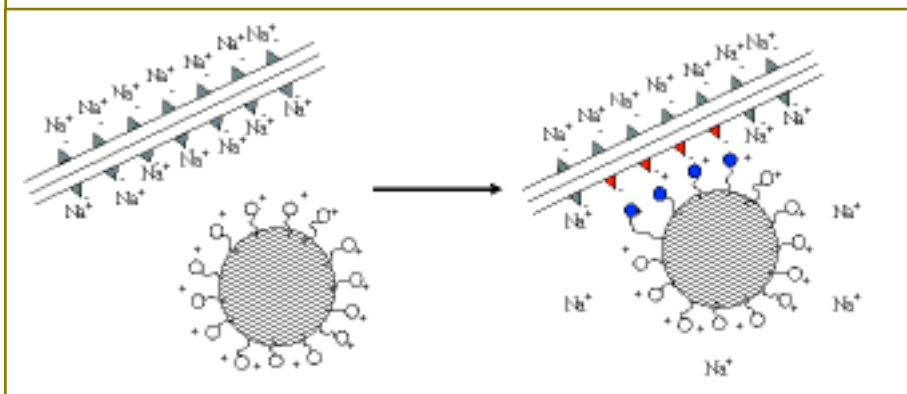
Section C covered a great variety of methods, special materials, and devices, such as sensors, electroluminescents in polymer composites, polymer gels as promising technological smart materials, latex-coated polymer materials as synthetic mimics for micrometeorites, and nanostructure polymer membranes for use in fuel cells. Particular interest was generated by a presentation on polymers as functional components in batteries and fuel cells (G. Wegner).

Section D covered a great number of biodegradable, biocompatible polymers, and their application as carriers for drug delivery and for surface modification, as well as stimuli-responsive and smart polymers. Biodegradable polymers synthesized from fatty acids have been used as injectable carriers for delivery of small drug molecules as well as peptides and proteins (A. Domb). An especially important biomaterial has revolutionized cardiology through the use of metal stents coated with poly (styrene- β -isobutylene- β -styrene) triblock copolymers (SIBS) that release a restenosis-preventing drug. This device has already been implanted in ~1 000 000 patients and reduced the need for invasive coronary bypass surgery by ~85% (J.P. Kennedy). Polymer nanofibers and nan-

otubes were also discussed as showing promise for medical applications (J.H. Wendorff). The roles of polymer networks, hydrogels, and polymer-based micro- and nanoparticles in controlled drug-delivery systems were also discussed (I. Eros).

The final presentation and closing remarks, made by the chairman of the conference (Gy. Marosi), focused on the convergent trends of advanced technologies. Polymer science and technology was long divided into several branches that developed almost independently. Due to specialization, there was only limited interaction between the research fields of natural and synthetic, hydrophilic and thermoplastic, and linear and cross-linked polymers. This situation is changing, however, as the gap between the different areas of research is gradually narrowing. Convergent concepts can be seen in the areas of advanced polymer systems used as pharmaceuticals, biomaterials, polymer composites, fire retardants, membranes, conductive polymer systems, and polymers used in fuel cells. The widespread use of the ATRP technique, the increasing importance of the controlled synthesis of nanostructures, special interface modifiers allowing the use of in-line controlled reactive processing methods, and advanced surface engineering/analysis are examples of the tendency toward convergence. Examples presented in the last talk of the conference included the use of process control for the synthesis of reactive surfactants and polymer dispersions intercalated with nanolayers, as shown in the figure below.

Such a structure is advantageous both for the controlled release of drugs from solid pharmaceuticals and for activating the protection mechanism in fire-retardant polymer systems. Raman microscopy is a method that is universally applicable in all advanced polymer technologies, and thus also represents a convergence of research areas. Quantitative chemical mapping of complex composites and pharmaceuticals, determination of polymorph structures at interphases of various macromolecular systems, and in-line detection of reactive extrusion of synthetic and biopolymers have been performed using the Raman system. Nanotubes as potential components of composites for drug delivery or in flame-retar-



Intercalated montmorillonite structure formed by emulsion polymerization, presented by Marosi.

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dant systems have also been analyzed in this manner. Lastly, the fire retardancy of biodegradable polymers is an excellent example of the convergence of different fields. The tendency toward convergence was clearly evident at the Budapest symposium and will surely continue to increase in Shanghai at PAT 2007.

The abstracts of all presentation are available at <www.bme.hu/pat2005>.

György Marosi <pat@mail.bme.hu>, a professor in the Department of Organic Chemical Technology at the Budapest University of Technology and Economics, served as chairman of the local organizing committee. Bertalan and Toldy were also members of the local organizing committee.

Heterocyclic Chemistry

by Girolamo Cirrincione and Anna Maria Almerico

The 20th International Congress of Heterocyclic Chemistry (20th ICHC) was held in Palermo, Italy, from 31 July to 5 August 2005. ICHCs are major scientific events that have been organized all over the world since 1967, attracting attendees from both industry and academia. These congresses are broad enough in scope to cover the whole range of heterocyclic chemistry, from theory to practical applications. The 2005 congress was organized by Professor Girolamo Cirrincione and Colleagues in the Department Farmacochimico, Tossicologico e Biologico, of the University of Palermo, under the auspices of the International Society of Heterocyclic Chemistry (ISHC) and of the Società Chimica Italiana (SCI).

Heterocyclic chemistry has undergone a noteworthy and scientifically intriguing expansion. In addition to the more traditional subjects of heterocycle synthesis and studies related to heterocyclic natural products, the field has grown to encompass pursuits in areas such as bioorganic and organometallic chemistry, to mention just two. The 20th ICHC was in line with established tradition, offering a scientific program dealing with

the latest developments in the following main topics: new methods in heterocyclic chemistry, biologically active heterocycles (pharmaceuticals and agrochemicals), heterocyclic natural products and analogues, and heterocycles in synthesis.

Award lectures were delivered by Larry Overman (University of California, Irvine, U.S.) for the Senior Award in Heterocyclic Chemistry, and by Alois Furstner (Max-Planck-Institut für Kohlenforschung, Mülheim/Ruhr, Germany) for the Katritzky Junior Award in Heterocyclic Chemistry.

The 32 invited speakers—26 from academia and six from industry—were organized into four parallel sessions. There were also 100 oral contributions in four parallel sessions and 282 poster presentations in three sessions. The plenary and invited lectures have been published in part vii of the 2006 volumes of ARKIVOC—the *Free Online Journal of Organic Chemistry* <www.arkat-usa.org/ark/ARKIVOC/arkivoc_articles.asp>.



ICHC organizers and staff with conference chairman Prof. Girolamo Cirrincione (held aloft in back row) and ICHC President Prof. Marco A. Ciufolini (seated in center of stage).