

The Mission and Challenges of Polymer Science and Technology

by R. F. T. Stepto

The inaugural **IUPAC Strategic Polymer Conference (PC2002)** took place 2–5 December 2002 in Kyoto, Japan, as part of the 50-year celebration of The Society of Polymer Science, Japan. It was held under the auspices of the Science Council of Japan and the Society of Polymer Science, Japan, and was organized by the Science Council of Japan and The Society of Polymer Science, Japan, with the assistance of the Macromolecular Division of IUPAC. The chairman of the organising committee was professor Seiichi Nakahama and the vice chairman was professor Kazuyuki Horie.

The conference was attended by 786 active participants of which 156 were students and 112 came from abroad. Notably, the participants came from 29 countries, demonstrating the world-wide appeal of the meeting.

The meeting was the brainchild of Professor Akihiro Abe of the Tokyo Institute of Polytechnics, an IUPAC Fellow and an active member of the Macromolecular Division of IUPAC. It was a new venture, being the first strategic meeting assessing the current fields of activity in polymer science and technology and future directions.

The conference purposely tackled many topics over its three days and therefore had a very concentrated timetable. In addition to the plenary lectures, there were 41 invited lectures, 19 session lectures, and 12 contributed oral presentations. The poster sessions contained 577 posters. The scientific program finished with a panel discussion assessing the messages and implications of the conference for polymer science.

The plenary lectures were given by Nobel Laureate Hideki Shirakawa (Council for Science and Technology Policy, Cabinet Office, Japan) on the Discovery of Conducting Polymers—Fortuity and Inevitability; Dennis A. Torchia (National Institutes of Health, Bethesda, USA) on Molecular Structure and Dynamics of Proteins in Solutions: Insights Derived from High-Resolution NMR Approaches; Jean-Pierre Sauvage (Université Louis Pasteur, Stasbourg, France) on Rotaxanes and Catenanes as Prototypes of Molecular Machines and Motors; and Masao Doi (Nagoya University, Japan) on Challenges in Polymer Physics.

The six broad areas of the conference were Polymer

Concepts in Chemistry, Physics, and Biology; Frontiers of Polymer Science; Advanced and Emerging Polymer Technologies; State of the Art in Biopolymers; Polymers and the Environment-Coexistence and Interaction; and Commodity Polymers and the World Economy. Both lectures and posters amply illustrated the numerous developments and increasing frontiers of polymer science. They showed how broad the subject had become since its foundation, 80 or so years ago and how the emphasis of polymer science had moved away from the macromolecule towards new materials, systems, and applications. However, the contributions also showed that molecular understanding and control are essential for understanding, predicting, and controlling properties and performance. Polymer science was seen to be a science interacting closely with many physical, chemical, and biological sciences and technologies, leading to new processes and materials, associated, for example, with information technology, high-performance composites, environmentally friendly, renewable-resource materials, and biological and medical applications.

Overall, the conference demonstrated that polymer science and technology cover very broad and continually expanding subject areas. They are at the core of many future scientific and technological developments. In spite of the growth and continuing diversity, the conference and the panel discussion showed that polymer scientists and technologists are still able to communicate and interact as a community. In this respect, the conference and discussion were extremely useful for defining common platforms and directions for the future. Further, the Macromolecular Division of IUPAC will be leading developments through its active fostering and integration of polymer activities worldwide and its newly launched strategic study of the needs of world polymer science.

The opening plenary lectures, together with a summary of the closing panel discussion are being prepared for publication in *Pure and Applied Chemistry* and papers from the invited lectures will be published in *Macromolecular Symposia*. The next IUPAC strategic meeting on the Mission and Challenges of Polymer Science will be held in 2005 in New York, under the chairmanship of Professor Kalle Levon of the Polytechnic University of New York.

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