



### **IN MEMORIAM**

#### **Kirill Ilyich Zamaraev (1939-1996)**

Professor Kirill Ilyich Zamaraev, IUPAC Past-President, R&D Director of the Boreskov Institute of Catalysis, died on June 26, 1996. Russia and the world have lost a wonderful person, a great scientist and an eminent statesman.

Kirill I. Zamaraev was born in Moscow, Russia, on May 20, 1939 in the family of a famous soviet chemical engineer. He began his professional education at the Moscow Mendeleev Institute of Fine Chemical Technology, then moved to the Moscow Physical-Technical Institute (MPhTI) in order to improve his knowledge of chemical physics. In both of these universities his rank as a student was number one.

He received a BSc degree from the MPhTI in 1963 and was awarded a PhD in chemical physics in 1966 and a DSc in physical chemistry in 1972 by the N. Semenov Institute of Chemical Physics (ICP) in Moscow (title of his doctoral thesis was "ESR study of structure and reactivity of transition metal complexes"). In 1966-1976 he did his research as junior research scientist, senior

research scientist and then Head of Laboratory at ICP, where he performed a wide set of important basic studies in the fields of elementary kinetics of electron spin exchange and tunneling electron transfer over large distances, as well as in the application of ESR and NMR to metal complex catalysts. At the same time he worked as an assistant professor at MPhTI. Since the beginning of the 1970s K. Zamaraev was drawn by academician N. Semenov into the studies on photocatalytic conversion of solar energy. In 1974-1975 he has been the first soviet long-term visiting scientist at Cornell and Stanford Universities as well as the University of Chicago under a Program of scientific exchange in chemistry between the USSR and the USA.

In 1976 Professor Zamaraev was elected corresponding member of the Academy of Sciences of the USSR and invited by academician G. K. Borezkov to join the Institute of Catalysis, Novosibirsk, as Deputy Director. Kirill Ilyich came to Novosibirsk early 1977 together with a large team of young chemical physicists and largely widened the studies of elementary catalytic reactions on the molecular-atomic level through application of modern physical and kinetic instrumental methods of investigation.

In 1984 Prof. Zamaraev became the Director of the Borezkov Institute of Catalysis, and since that time he was the real leader of all research and development activity of this huge (more than 1000 people in staff) Institute.

From 1986 till 1992 Prof. Zamaraev held the position of General Director of the large R&D association known as "MNTK Katalyzator Group". Since 1985 he was Chairman of the Scientific Council of USSR (now Russian Federation) on Catalysis and its Industrial Applications being the leader of the community of specialists in catalysis of the Russian Academy of Sciences. Since 1977 he was Full Professor of the Novosibirsk State University having the chair in physical chemistry.

During recent changes in the former Soviet Union Professor Zamaraev was in charge of important transformations of Russian science on the way to its adaptation to a society with a market economy. He participated as a leading person in the formation of a large network of Federal Research Centers of Russia, which now include together with the Russian Academy of Sciences, the main scientific potential of Russia.

In 1994 the status of Federal Research Center was assigned also to the Borezkov Institute of Catalysis. In 1995, according to his own will, Kirill Zamaraev resigned the position of Director of the Borezkov Institute of Catalysis, remaining the R&D Director of the Institute. The background of this decision was his sincere desire to spend more time on doing deep fundamental science.

Professor Zamaraev has been honored by the Russian Academy of Sciences and the international community of chemists on several occasions. In 1987 he was elected a Full Member of the Academy of Sciences of the USSR (now

Russia), in 1990 – a Member of the Academia Europea and a Foreign Fellow of the Indian National Science Academy, in 1995 – a Foreign Fellow of the Korean Academy of Science and Technology. In 1994 he was awarded by the Silver medal of the Royal Society of Chemistry of Great Britain, as a centenary lecturer, in 1994 – the Karpinsky medal of the Chemical Society of Germany.

Since the 1960s Professor Zamaraev has been a member of the International Union of Pure and Applied Chemistry. In 1987-1989 he was the President of the IUPAC Physical Chemistry Division, in 1990-1993 he organized the work of the Editorial Advisory Board for Monographs on Chemistry for the 21st Century, was a member of the IUPAC Executive Committee and Bureau. In 1994-1995 he held the position of President of the IUPAC. In January 1996 he became the IUPAC Past-President.

Professor Zamaraev participated in the work of numerous scientific journals - Russian as well as international. He was the Editor-in-Chief of *Reaction Kinetics and Catalysis Letters*, Regional Editor of the *Journal of Molecular Catalysis*, Member of the Editorial Boards of the journals *Catalysis Reviews*, *Catalysis Today*, *Catalysis Letters*, *Topics in Catalysis*, *Chemistry – A European Journal*, *Mendeleev Communications*, *Chemistry for Sustainable Development* and some other journals.

Professor Zamaraev is known for his mechanistic studies on catalysis at the molecular-atomic scale, and in particular for *in situ* characterization by the use of radiospectroscopic methods, *viz.* electron spin resonance (ESR) and nuclear magnetic resonance (NMR). At the initial stage of his career Professor Zamaraev studied by ESR the structure of transition metal complexes in solution and made considerable contribution to the strategy of interpretation of complex EPR spectra of powder samples and reliable determination of EPR parameters.

He has discovered and kinetically characterized numerous electron tunneling reactions over large distances. He has performed pioneering experimental studies of reactions of electron tunneling between donor-acceptor pairs frozen in neutral matrices. He has demonstrated the possibility of electron tunneling over distances of 15-30 Å and explored in detail the kinetics of this phenomenon in the time range from  $10^{-6}$  to  $10^5$  s. His fundamental studies of electron spin exchange in solution are also well known.

He was one of the pioneers of modern multinuclear solid state NMR in studies of the structure and active sites on catalyst surfaces and of intermediates of catalytic reactions in solutions and on solid surfaces.

He paid great attention to the study of chemistry in the second coordination sphere of metal complexes and the role of outer sphere interactions in the mechanisms of catalytic reactions. He was among the first to study catalytic reactions in the gas phase by ion cyclotron resonance (ICR).

The works of Professor Zamaraev in photocatalysis and design of catalytic converters of solar energy utilization, as well as on the role of photocatalytic phenomena in the global chemistry of atmosphere are the contribution to XXith century science and technology. The approaches developed by Professor Zamaraev towards catalysis research helped to obtain unique results that were important for catalysis, fundamentals and applications.

He published 3 monographs and over 300 papers in Russian and foreign journals. Kirill Ilyich was a man of great heartfelt generosity, honesty, decency and kindness. He was a perceptive connoisseur of music and poetry. He really enjoyed the rare moments of contact with nature and he even celebrated his 50-th birthday with his friends climbing and hiking in the mountains.

It is not only Russian science which has lost a foremost personality but this is a tremendous loss to the international catalysis and chemistry community. He left us unfairly early. He will be missed by his many friends and colleagues.

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