

Gennady Zaikov

**PROFESSOR PIOTR TOMASIK:
OVER HALF A CENTURY IN SCIENCE**

*N.M.Emanuel Institute of Biochemical Physics, Russian Academy of Sciences
4 Kosygin str., 119334 Moscow, Russia
chembio@sky.chph.ras.ru*

© Zaikov G. 2008

In March 2009 Prof. Piotr Tomasik will start the second half of a century of his scientific activity. Prof. Tomasik was born in Drohobycz (Poland at that time, now Ukraine) on May 19, 1937 in the family of Zdzislaw (Ph.D. in chemistry, professor and head of Institute of Petrochemistry of the Technical University of Wroclaw, Poland) and Helena (graduate of Vienna Conservatory). In June 1959 he obtained his MSc degree in Petrochemistry at the College of Chemistry of the Technical University of Wroclaw. Already in March of the same year he moved to the Department of Organic Chemistry of the College of Pharmacy of Wroclaw Medical University. After two years of research on barbiturates he returned to his native University and until 1967 worked there in the field of pyridine chemistry at the Department of Organic Chemistry under supervision of Prof. Edwin Plazek and Prof. Zofia Skrowaczewska. His scientific interest was accompanied by his involvement in the structure-reactivity thermodynamic relationships in heterocyclic compound series. In 1966 under the supervision of Prof. Zofia Skrowaczewska he defended his PhD thesis "On polarographic and chemical reduction of 3,5-dinitropyridine and its derivatives". In 1967 he moved to Wroclaw Laboratory of the Institute of Organic Chemistry of the Polish Academy of Sciences in Warsaw.

In 1969 Dr. Tomasik worked as a postdoctoral research associate in the group of Prof. Rudi A. Abramovitch at the University of Alabama on amination and acylation of pyridine-1-oxides with imidoyl chlorides. Then he returned to Wroclaw and continued his study of applications of Hammett equation in heterocyclic chemistry. Among others, Piotr Tomasik elaborated a complex description of the transmission of the substituent effects across the pyridine ring including the *ortho* effect. In the beginning of 1973 Piotr Tomasik moved to newly founded Normal University in Czestochowa where for over 5 years he chaired the Department of Organic Chemistry and served as Vice-Rector for Research. Under sponsorship from the US National Science Foundation and the Maria Sklodowska-Curie Foundation he continued scientific cooperation with Rudi Abramovitch on reactions of pyridine-1-oxides with imidoyl chlorides, reactions of

pyridine-1-oxide nitrenes and high pressure oxidation of pyridines with copper (II) and silver (I) sulphates. He found that pyridine complex with copper (II) sulphate on elevated pressure produced 1*H*-pyridine-2-one and copper metal in the intramolecular rearrangement. 2-Ethylpyridine was oxidized with silver (I) sulphate at the *a*- and *b*-carbon atoms of the side chains. In 1973 he defended his DSc thesis "On application of Hammett equation in heterocyclic chemistry". In that period he continued his involvement in thermodynamics and novel syntheses in pyridine systems with particular attention paid to the reactivity of nitramino groups in nitraminopyridines and to pyridine analogues of chlorodinitrobenzene, picric acid and picryl chloride in the Zincke reaction. At that time Prof. Tomasik turned to coordination chemistry paying his attention to the influence of the central metal atoms in the Werner complexes on the reactivity of the pyridine ligands. These research problems were continued after he moved to the Agricultural University in Cracow in 1978 as a full professor.

Continuing his involvement in organic synthesis, beginning from 1980 Prof. Tomasik turned to solvent effects and chemistry of polysaccharides with particular attention paid to starch. In that period he studied thermal decomposition of saccharides, oligosaccharides, and polysaccharides including novel caramels, secondary food aromas and British gums for novel applications – *e.g.* in selective flotation of complex metal ores. Dextrins produced by thermolysis of starch with some biogenic amino acids provided excellent separation of galena from chalcocite. Moreover, water insoluble dextrins formed in such reactions appeared to be suitable prebiotics for *Bifidobacteria*. In heterocyclic synthesis Prof. Tomasik focused on pyrazolo[3,4-*b*] and [1,5-*a*] quinolines. Initially he considered these compounds as inducers of interferone and then he found them interesting luminophores emitting blue light from the solid state. These compounds were successfully tested in light emitting diodes.

In 1984 Prof. Tomasik signed a two-year contract with Garyounis University in Benghazi in Libya. He promoted the first two MSc students in the history of the College of Chemistry of that University. Prof. Tomasik's

interests in starch transformations involving physical, physicochemical, and chemical properties have grown. He applied several sources of energy for physical modification of starch such as low-pressure glow plasma, corona discharges, microwave radiation, lasers, polarized light, deep freezing, and others. Polarized light caused scission of side chains in amylopectin and allows repolymerization of these short chain fragments into amylose-like linear polysaccharides. Deep freezing combined with mechanical disintegration of granular starch provides a new original method of production of nanostarch. Prof. Tomasik also studied numerous chemical and physicochemical modifications of starch – leading to various starch complexes. Biodegradable polysaccharide-protein complexes, microcapsules and binders in nanometric metal oxide powder based ceramics are the major potential applications. Among others, Prof. Tomasik elaborated a series of solid state, wasteless, microwave assisted chemical modifications of starch.

In the early nineties of the last century Prof. Tomasik organized an International Starch Symposia in Cracow, which in 2001 became an International Starch Symposia held in Cracow in even years and in Moscow in odd years. In this period he initiated studies on metal – metal interactions in various biological systems such as bacteria, yeast, fungi, nematodes, daphnia, and freshwater snails. These studies were carried out in Poland and in Zimbabwe where in 1991-1993 Prof Tomasik held a chair of the Department of Chemistry of the University of Zimbabwe in Harare. It was demonstrated that certain combinations of metal ions can stimulate productivity and pathogenicity of entomopathogenic nematodes and fungi. Antagonism between metal ions reducing lethality of metal ions is more frequent than synergism. Properly selected combinations of metal ions can be utilized in extermination of certain organisms from the environment.

Since 2002 Prof. Tomasik began his research in the area of nanotechnology. In his studies he focused on purification and chemical derivatization of carbon nanotubes, generation of quantum dots, metal nanopowders and nanostarch. He utilizes his experience in organic synthesis, chemistry of polysaccharides, and coordination chemistry combining all these elements in his nanotechnology involvement.

As a long-term visiting researcher/professor Piotr Tomasik spent several years at Iowa State University, Saginaw Valley State University, Clemson University (all in the US), Tokyo University, and Academia Sinica in Taipei, Taiwan. He also delivered lectures in numerous research institutes and universities in Slovakia, Austria, Italy, UK, Germany, the Netherlands, Denmark, France, Republic of South Africa, Japan, Thailand, Hong Kong, Taiwan, Republic of China, and Russia. Prof. Tomasik was an active participant of over 180 scientific symposia worldwide.

Following is the list of Prof. Tomasik's academic contacts:

- * Rudi Abramovitch, University of Alabama and Clemson University, SC, USA
- * J. Andereg, Ames Laboratory, Ames, IA, USA
- * K. Araki, Institute of Industrial Research, Tokyo University, Japan
- * D. Bakos, Department of Chemistry, Technical University, Bratislava, Slovakia
- * M. Charton – Pratt Institution, Brooklyn, NY, USA
- * J. Jane – Department of Food Science and Human Nutrition, Iowa State University, USA
- * R. Jankowiak, Ames Laboratory, Ames, IA, USA
- * C.D. Johnson, University of East Anglia, Norwich, UK
- * A.V. Kanarskii – Kazan Technical University - Russia
- * D. Karpovich , Saginaw Valley State University, USA
- * Alan R. Katritzky, Florida State University, Gainesville, USA
- * V.M.-F. Lai, Providence University, Taichung, Taiwan
- * C.Y. Lii, Department of Chemistry, Academia Sinica, Taipei, Taiwan
- * S. Lu, Taiwan University, Taipei, Taiwan
- * C.H. Magadza, Department of Biology, University of Zimbabwe, Harare, Zimbabwe
- * G.H.W. Milburn, Napier University, Edinburgh, UK
- * A. Perjessy, Department of Chemistry, Jan Amos Komensky University, Bratislava, Slovakia
- * S. Ring, Institute of Food Research, Norwich, UK
- * C.H. Schilling, Iowa State University and Saginaw Valley State University, USA
- * Y.T. Tao, Academia Sinica, Taipei, Taiwan
- * M. Uher, Department of Chemistry, Technical University of Bratislava, Slovakia
- * Y.J. Wang, University of Arkansas, USA
- * M. Warren, Department of Biology, Iowa State University, USA
- * Wei Zhong – Fudan University, Shanghai, Peoples Republic of China
- * V.P. Yuryev – Institute of Biochemical Physics, Russian Academy of Sciences
- * M.F. Zaranyika – Department of Chemistry, University of Zimbabwe, Harare.

Prof. Tomasik published 5 textbooks and 330 research papers. He is the holder of 60 domestic and foreign patents. He translated into Polish three monographs, two from English and one from Slovak, and supervised 29 PhD theses.