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Editorial

Sixteenth Brazilian Meeting on Analytical Chemistry (Brazil, 2011)

The 16th Brazilian Meeting on Analytical Chemistry (16th ENQA) was held on October 23 to 26, 2011, in Campos do Jordão, São Paulo State, Brazil. The event was organized by the Institute of Chemistry of the University of São Paulo, in cooperation with the Division of Analytical Chemistry of the Brazilian Chemical Society.

The theme *Analytical Chemistry without Frontiers* was adopted as a way to show the interdiscipline of Analytical Chemistry and to promote the exchange of knowledge between Brazilians and researchers from abroad, aiming to overcome the new challenges for the Brazilian society. Based on this theme, several aspects of the Analytical Sciences were discussed and it was possible to join specialists and to show how Analytical Chemistry is linked to the environment, forensic and biological sciences, food chemistry, pharmacology, technological products, instrumentation, agribusiness, petrochemistry, education, metrology, and chemometrics, among others. Additionally, it was an important moment for reflection and discussion on Analytical Chemistry as part of the International Year of Chemistry 2011 celebration, especially because Brazil is experiencing an important period of development.

The 16th ENQA had around 1140 participants, including professors (167), elementary school teachers (17), researchers (62), graduate (434) and undergraduate (292) students, professionals from various industries and technicians (79), and dealers from different companies.

The scientific program involved 5 short-courses, 1 workshop, 6 plenary lectures, 16 short-conferences, 64 oral presentations, 3 symposia and 921 poster presentations.

This special issue presents 29 papers selected from works discussed during the 16th ENQA. We have received more than 70 submissions that were reviewed by experts in each respective area and final decisions were done jointly by Professors Sérgio Luis Costa Ferreira (UFBA), Emanuel Carrillho (IQSC-USP), Fábio Rodrigo Piovezani Rocha (CENA-USP), Joaquim de Araújo Nóbrega (UFSCar), Lauro Tatsuo Kubota (IQ-UNICAMP), Pedro Vitoriano Oliveira (IQ-USP), and Ricardo Erthal Santelli (UFRJ).

The papers published in this special issue include a great variety of topics on analytical sciences (graphite furnace atomic absorption spectrometry, inductively coupled optical emission spectrometry, inductively coupled plasma mass spectrometry, high-performance liquid chromatography, capillary electrophoresis and gas chromatography) and methods for sample preparation using *on-line* UV decomposition, microwave-induced combustion, micro-extraction applied for a diversity of samples, including environmental application, foods, fuels, etc.

We would like to thank all the authors of this special issue for the contributions and we have a special acknowledgment to all reviewers of the submitted manuscripts, who spent their time and shared their expertise to contribute for the quality of this issue.

We would like to express our special gratitude to the Editor-in-Chief of Microchemical Journal, Professor Joseph Sneddon, for the opportunity to realize this project.

The 16th ENQA granted special honors to four Brazilian and one Russian professors for their outstanding contributions to the development of Analytical Chemistry. Some highlights of their careers are summarized below.

Tribute to Orlando Fatibello Filho
Universidade Federal de São Carlos



Orlando Fatibello Filho was born in 1952 in São Paulo, state of São Paulo (SP), Brazil, where he received his primary and secondary education, while working part-time. In 1973 he went to the Federal University of São Carlos (UFSCar), São Carlos, SP, to study Chemistry and stayed there up to the present. In 1976 he graduated as a Licentiate and was immediately hired as a Teaching Assistant, while pursuing a Master's degree at the University of São Paulo (USP – São Carlos campus), which he obtained in 1980. Without leaving his job at UFSCar he completed his Ph.D. in Analytical Chemistry under the supervision of the late Professor Eduardo F. A. Neves at Instituto de Química, USP – São Paulo campus in 1985.

When Dr. Fatibello left for the US in 1987 for a two-and-half-year long postdoctoral training under the supervision of the late Professor G. G. Guilbault at the University of New Orleans, he had already established a first research laboratory in Analytical Chemistry at UFSCar and accepted some students. Once back to São Carlos, he formed a research group that has grown rapidly and became very active and productive, achieving reputation in Brazil and abroad especially in the field of modified electrodes and amperometric biosensors based on the use of enzymes from vegetable tissues and crude extracts from readily available plants and fruits. The interests of the group are much broader and include, for example, the development of analytical instrumentation, integration of electroanalytical and optical sensors and bioreactors into flow analysis systems, formulation of methods for the analysis of food and pharmaceutical products, preparation of experiments and tutorials for teaching and so forth, as can be appraised from the titles of about two hundred papers – many of them amply cited – and the subjects of over 50 Ph.D. theses and Master's

dissertations supervised by Prof. Fatibello, besides the projects of many undergraduates and several post-docs. His numerous followers are now widespread across the country working mainly in the academy, and they acknowledge both his leadership and friendship.

Prof. Fatibello was one of the key persons in the creation and consolidation of the successful Graduate Program in Analytical Chemistry of UFSCar. He actively coordinated the program for several years and headed the Chemistry Department of UFSCar as well. During a long sabbatical in Portugal (2008–2009), he acted as a visiting professor of the University of Coimbra. Prof. Fatibello was a former Director of the Division of Analytical Chemistry of the Brazilian Chemical Society and is a member of the editorial boards of *Analytical Letters* and *Journal of Analytical Methods in Chemistry*, and a senior editor of *Chemical Sensors*.

Prof. Fatibello is also a frequent and amazing speaker that captivates audiences, enlightening his enthusiastic connection with research activity in a straightforward language, well-tempered with humor and joy of life, whether lecturing in a conference auditorium, classroom or laboratory, discussing in a science meeting or enjoying a party. As a genuine recognition of his intense scientific work and great academic enrollment he was promoted to the position of Full Professor of UFSCar in 2003, chosen as one of the honorees of this 16th Brazilian Meeting on Analytical Chemistry (ENQA, 2011) and also just elected as a full member of the Academy of Science of the State of São Paulo (ACIESP).

Prof. Dr. Ivano G. R. Gutz, Instituto de Química, USP, São Paulo, SP, Brazil. gutz@iq.usp.br.

Tribute to Francisco Radler de Aquino Neto
Universidade Federal do Rio de Janeiro



Francisco Radler de Aquino Neto was born in Rio de Janeiro. He received his Bachelor's degree in Chemistry (1969) and his Chemistry's degree (1970) from the Federal University of Rio de Janeiro, where he also received his Doctorate degree (1978). In 1979/1980 and 1981/1982, he did post-doctoral studies with Professor P. Albrecht at University Louis Pasteur, Strasbourg, France and with Dr. Jeremy K. M. Sanders at University Chemical Laboratory, Cambridge University, England.

Prof. Radler has been very active in teaching at both the undergraduate and graduate levels. He has supervised a significant number of students in their degree programs, with 30 doctorates, 39 masters, 23 post-docs and more than 90 undergraduate research students.

Prof. Radler started his research activities in geochemistry as an undergraduate student under the supervision of Prof. Claudio Costa Neto in a successful project named "shalechemistry". At this same time, Prof. Radler used the first magnetic nuclear resonance equipment in Brazil applied to organic chemistry in order to elucidate cyclic terpene structures in fossil fuels. In 1982 he returned to Brazil, having completed his two post-doc studies, and started collaboration with the Petrobras Research Center (CENPES) for studies of organic biomarkers of concern in the petroleum industry which was applied to the first geochemical oil prospecting in the Campos basin. Since 1985, after the inception of the LADETEC (Laboratory for the Technological Development) by UFRJ, a lot of scientific activities have been developed. Since 2001, Prof. Radler

has been collaborating with the Brazilian Metrology Institute and helping in the implementation of Chemistry Metrology in Brazil. From 2002 to 2005 he acted as scientific adviser at the Geochemistry Division of the Petrobras Research Center and up to now he develops scientific researches in this area. In 2002 the doping control laboratory (LAB DOP) was accredited by the ISO 17025 by Inmetro (Instituto Nacional de Metrologia, Qualidade e Tecnologia) and by the IOC (International Olympic Committee). Its recognized quality enabled the realization in Brazil of the Pan-American Games in 2007 and paved the way for the Brazilian applications for the 2014 World Cup and for the 2016 Olympic Games. A new building is being built to house the new facilities of LAB DOP. Currently, Prof. Radler participates in several research networks as such as RBLE-Inmetro, RBC-Inmetro, RLRC-MAPA/SIBRATEC, Rede ANP, RTG – Petrobras, Rede WADA and REBLAS-ANVISA/MS.

Among his foreign activities as Professor, Prof. Radler is a Professeur Invité at Université Louis Pasteur at Strasbourg, France and an Invited Professor at the Proteomics and Mass Spectrometry Laboratory with Dr. Catherine Fenselau of the Structural Biochemistry Centre of the University of Maryland, Baltimore, USA. Prof. Radler is recognized by his leadership in science by the Rio de Janeiro government as a "Cientista de Nosso Estado" of FAPERJ, as member of the Brazilian Academy of Science and also as a member of the International Academy of Indoor Sciences. He is a 1A Researcher (highest level) of the Brazilian National Research Council (CNPq). He was awarded with several medals including "Benemérito" from Confederação Brasileira de Futebol, the Brazilian Chemical Society "Simão Mathias medal" and the "Ordem Nacional do Mérito Científico" by the Brazilian President, among others.

Prof. Radler's main research areas are high resolution gas chromatography, mass spectrometry, molecular organic geochemistry, geochemistry prospecting, indoor air quality, doping control, natural product chemistry, environmental, forensic, toxicological and pharmacological chemistry and process control among several other areas of concern.

Certainly, this brief summary of his academic activities confirms the decision of the 16th Brazilian Meeting on Analytical Chemistry (ENQA) in selecting Prof. Francisco Radler de Aquino Neto as one of their honorees for 2011.

Tribute to Jailson Bittencourt de Andrade
Universidade Federal da Bahia



Jailson Bittencourt de Andrade was born in Ubaíra, Bahia Brazil on December 25th, 1951. He is a Full Professor in the Department of General and Inorganic Chemistry, at the Institute of Chemistry of the Universidade Federal da Bahia – UFBA, and is a member of the Brazilian Academy of Sciences <http://www.abc.org.br/org/aca.asp?codigo=jailsong>. He finished his undergraduate studies in Chemistry at UFBA in 1976 and his Master in Science in 1979. He received his Ph.D. from the Pontifícia Universidade do Rio de Janeiro (PUC-RJ) in 1986. He did post-doctoral studies in 1988 at the Brookhaven National Laboratory (NY-USA) and he was an Associate Researcher at the Desert Research Institute (NV-USA) in 1991. Currently, he is the

director of the National Institute for Science and Technology in Energy and Environment (<http://www.inct.cienam.ufba.br/>).

J. B. de Andrade's work includes analytical, environmental and inorganic chemistry. His studies present seminal contributions to the understanding of chemical reactions of PAHs and carbonyl compounds in the gas phase, liquid phase and associated atmospheric aerosols and atmospheric reactions involving ozone. Additionally, he has developed new analytical methods for the determination of organic and inorganic chemical species in liquid and gas phases or associated aerosols. Recently he has developed new analytical methods for the determination of pesticides using green chemistry protocols, like single drop microextraction.

The decision of the 16th Brazilian Meeting on Analytical Chemistry (ENQA) in selecting Prof. J. B. de Andrade as one of their honorees for 2011, is supported by his outstanding activities in scientific research in the fields of Inorganic Chemistry, Analytical Chemistry and Environmental Chemistry, with focus in: development of new analytical methods for the determination of organic and inorganic chemical species in liquid media and gas phases, or associated atmospheric aerosol particles; study of atmospheric reactions of polycyclic aromatic hydrocarbons, aldehydes, alcohols, sulfur compounds, nitrogen compounds, ozone, olefins and carboxylic acids; study of the equilibrium between the vapor- and aerosol-phase of aldehydes and mercury; the diffusion and transport of atmospheric aerosols; kinetic oxidation of S(IV) catalyzed by metals; study of the mechanism of formation and properties of double sulfites containing Cu(I) and other transition metals; and the study of organic and inorganic compounds in fuels, foods and beverages.

Some of his main achievements include the establishment of the profile of aldehyde emissions from vehicles using ethanol, diesel and diesel/biodiesel blends, the impact of the use of catalysts in the reduction of these emissions, and the conduction of pioneering studies which established a correlation between vehicle exhaust emissions of formaldehyde and acetaldehyde and their concentrations in the atmosphere. Prof. Andrade established the kinetics of the reactivity of HPAs in the gaseous- and particulate-phase, which are of great importance for their accurate use in the allocation of emission sources, and correlated these emissions with the vehicular fleet. Regarding nitro-PAHs, he studied the correlation between the mutagenic potential of these compounds and the redox potential of the nitro group. He is a Brazilian pioneer in the study of the reactivity of olefins and monoterpenes with ozone, the photochemical generation of ozone by alcohol and gasoline blends, and the study of atmospheric particulate matter at the sub-micrometric and nanometric diameter scales.

The administration experience of Prof. de Andrade includes, among others, seven years as the Coordinator of the Graduate Program in Chemistry at UFBA, two years as the Chairman of the Board of Education of Graduate and Research of UFBA, as well as the Presidency of the Regional Council of Chemistry (7th Region), the Presidency of the Brazilian Chemical Society, the Coordination of Editors of the Journal of the Brazilian Chemical Society (<http://jbcs.sbq.org.br/>), and the coordination of several high impact research projects.

Tribute to Francisco José Krug

Centro de Energia Nuclear na Agricultura – Universidade de São Paulo



Francisco José Krug, our dear friend and well known *Chico*, has a long and successful career at the University of São Paulo where he had

started as an undergraduate student in agronomy and now acts as a Full Professor since 2005. Prof. Krug was a pioneer of Flow Analysis and received his Doctorate degree at USP in 1984 with a thesis titled "Flow injection turbidimetric determination of sulfate in waters and plants" under the supervision of the late Prof. Henrique Bergamin Filho, one of the precursors of instrumentation in Analytical Chemistry in Brazil. This was one of the first applications of turbidimetry in flow injection analysis and opened new horizons for developments of critical applications using excellent characteristics of flow analysis for the management of analytical operations. Based on his sound experience, Prof. Krug was one of the leaders of the successful implementation of flow injection analysis for routine analysis of agronomical and environmental samples during the 1980s at the Center of Nuclear Energy in Agriculture, University of São Paulo (Piracicaba, São Paulo State, Brazil). This was an amazing experience for everybody who had the chance to be there at this time and as part of this development, Prof. Krug has started a strong activity as supervisor of undergraduate and graduate students. Nowadays he has finished the supervision of 20 masters and 15 doctorates in analytical sciences in his main research topics, i.e. atomic spectrometry, flow injection analysis, sample preparation for inorganic analysis and more recently laser induced breakdown spectrometry. In all these areas he has done landmark contributions in the literature with more than 100 papers that have received around 3400 citations, which made him one of the most cited scientists in Brazilian chemical sciences who paved the way for new advancements of Analytical Chemistry in Brazil. Prof. Krug started in 1996 the Workshop on Sample Preparation that created a tradition of Brazilian researches in this area and is in its 9th edition this year. He also has edited a book written in Portuguese in this area. Probably, most of these aspects are well known by the scientific community. It is also known how a great and gentle person he is and how he balances his decisions with full respect to both academic and human values. What a great heart and what a nice example! In addition to all his achievements in science, he is a profound expert in classical and Brazilian music and he shares this love with a wonderful family of superb musicians. All these achievements and outstanding qualities made him one of the scientists honored during the 16th Brazilian Meeting on Analytical Chemistry (ENQA) in Brazil. Surely all fortunate enough to know him were glad about this tribute and have some nice memories about our friend *Chico*.

Tribute to Boris L'vov

University of San Petersburgo



Professor Boris Vladimirovich L'vov was born in Leningrad on 9 July 1931. L'vov's academic training was obtained at the Leningrad State University from which he graduated in 1954. He started his academic career at the Institute of Applied Chemistry in Leningrad, where he conducted research for 20 years. In 1962, he received the degree of Candidate of Chemical Sciences (Ph.D.) and in 1973, the degree of Doctor of Physical-Math Sciences. In 1975, L'vov was invited to head the Analytical Chemistry Department (as a Full Professor of Analytical Chemistry) at the Leningrad Polytechnic Institute (nowadays, the St. Petersburg State Polytechnic University). In 1991, he was elected as a Full Member into the Russian Academy of Natural Sciences.

The scientific community recognizes Professor L'vov primarily as the man who created electrothermal atomic absorption spectrometry (ET AAS). He proposed the idea of ET atomization based on total evaporation of the sample in a miniature graphite-tube furnace and introduced many important innovations into ET AAS to improve the sensitivity, precision, accuracy and detectability of the analyses.

Prof. L'vov is the author or co-author of four books and more than 280 papers (that have received more than 5600 citations), and has given more than 100 plenary and invited lectures at international conferences.

The contribution of Prof. L'vov to the development of ET AAS has been acknowledged by the scientific community. Because of this he has received many prizes in many different countries.

Showing that it is always appropriate to be curious and to desire to investigate new issues, in the 1980s Prof. L'vov concentrated on fundamental studies in the kinetics and mechanisms of solid-state reactions. More than 100 papers and two books have been published in this field. As a result of theoretical and experimental investigations by ET AAS, QMS (quadrupole mass spectrometry) and TA, (thermoanalysis) a new thermochemical approach to the interpretation of the kinetics of solid-state reactions has been proposed and developed. Recently Prof. L'vov started investigations into the kinetics and mechanisms of catalytic oxidation of CO over PtO₂, one of the urgent problems of modern catalysis.

Profa. Solange Cadore, Instituto de Química, UNICAMP, Campinas, SP, Brazil, cadore@iqm.unicamp.br.

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Sérgio L.C. Ferreira
Universidade Federal da Bahia, Salvador, BA, Brazil
Corresponding author.
E-mail address: slcf@ufba.br.

Pedro V. Oliveira
Universidade de São Paulo, São Paulo, SP, Brazil
E-mail address: pvolivei@iq.usp.br.

Fábio R.P. Rocha
Universidade de São Paulo, Piracicaba, SP, Brazil
E-mail address: frprocha@cena.usp.br.

Joaquim A. Nóbrega
Universidade Federal de São Carlos, São Carlos, SP, Brazil
E-mail address: djan@ufscar.br.

Lauro T. Kubota
Universidade Estadual de Campinas, Campinas, SP, Brazil
E-mail address: kubota@iqm.unicamp.br.

Ricardo E. Santelli
Universidade Federal do Rio de Janeiro, Brazil
E-mail address: santelli@iq.ufrj.br.

Emanuel Carrilho
Universidade Federal de São Paulo, São Carlos, SP, Brazil
E-mail address: emanuel@iqsc.usp.br.

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