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EDITORIAL

Euroanalysis XX the European conference on analytical chemistry

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Nowadays, academic analytical chemistry has become the main discipline and very common all over the world. Analytical chemistry plays an important role in the pharmaceutical industry, environmental monitoring, medical diagnostics, food production, and forensic sciences. It is also of great importance in different research areas. In these areas, method development in itself involves sensitive, faster, cheaper, simpler, and/or more environmentally friendly analytical methods. Analytical chemistry will continue to be an important part of undergraduate and postgraduate education in chemistry, not only for natural scientists and engineers but also for truly translational and interdisciplinary initiatives.

It is an undoubted fact that analytical chemistry is of fundamental importance not only for all branches of chemistry, but also for all biological sciences, engineering, and more recently medicine, environmental and public health. During the twentieth century, academic analytical chemistry was not as widely established in the world. Modern analytical systems, based on the introduction of apparatus working directly in production process facilities and the use of automated equipment for laboratory assays, enable quick and efficient control of the execution of technological processes, starting with raw processes. These processes continue from the material and all production stages to the final products.

Analytical chemistry plays a decisive role in the control of technological processes and has strengthened its position as the most important branch of science that makes a special contribution to both the production of goods needed by modern society and scientific research. As a feature of modern analytical chemistry, the preparation of new methods of analysis allows talented researchers from the newest and various branches of science to participate more and more actively. Physicists, mathematicians, electronics experts, cyberneticians, etc. from different fields work in partnership with analytical chemistry. Analytical chemistry is also used in more fields than ever, with both basic and applied research and commercial production. It is used more in applied sciences to obtain new products of high grade and especially high purity. The use of raw materials, the continuity of technological processes, and the qualitative control of the resulting products are impossible under existing conditions without the direct assistance of analytical chemistry.

In this respect, modern practice has made it possible to use analytical chemistry in a wide variety of fields. These fields can be ordered as chemical, petroleum, environmental, metallurgical, food, nanotechnology, biotechnology, biosensors, omics etc.

The trends and perspectives for the next few years are also highlighted, when it is expected that new developments and tools will allow a better knowledge of chemical composition in the new application area. The evolving power and sophistication of analytical instrumentation has made it possible to perform sensitive and selective investigations at ever smaller size scales with greater sensitivity and finer ranges of differentiation. Multiply hyphenated techniques, such as gas chromatography/mass spectrometry with retention time locking, liquid chromatography/time-of-flight mass spectrometry, microfluidic-based capillary electrophoretic analysis of mitochondrial DNA, laser ablation inductively coupled plasma mass spectrometry, provide selectivity and sensitivity of the analytical method at unprecedented levels from biological sources.

Analytical chemistry still continues to be an important branch of undergraduate and postgraduate educations in chemistry, not only for natural scientists and engineers but also for truly translational and cross-disciplinary initiatives involving biotechnologists, nanotechnologists, pharmacists, medical students etc. There is also a need for educated analytical chemists in the future. Analytical chemistry is important, as evidenced by a recent survey by the European Association

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for Chemical and Molecular Sciences (EuChemS) that received responses from high numbers of chemists and chemical engineers in Europe. Therefore, there is a clear need to pay more attention to research and education in analytical chemistry, to follow current trends and results on the subject, especially interdisciplinary efforts, where analytical chemistry plays an important role.

One forum for discussing research and education in all aspects where analytical chemistry plays a role, including fundamental and applied sciences is the Euroanalysis conference series. The 20th Euroanalysis conference series was held in the historical city center of Istanbul, Turkey, organized under the umbrella of the Division of Analytical Chemistry (DAC) of EuChemS and supported by the Turkish Society of Chemistry, Ankara University and Istanbul University.

A total of 614 participants covering 243 local and 331 international participants from 56 countries, and 40 company representatives attended the conference, despite some fears due to negative impacts of the economic crisis. According to the participant numbers, the top 10 foreign countries were Spain, Algeria, Russia, Italy, Austria, Belgium, Romania, Czech Republic, Germany and Portugal, respectively. The conference provided the participants with an overview of current research in analytical chemistry by holding four parallel sessions with 15 plenary and 40 keynote lectures in 37 sessions. At the conference, there were oral presentations made by 218 scientists in different sessions and 317 scientists made poster presentations. All topical sessions were chaired by two chairs. In addition, 24 of the posters were pitched in special poster pitch sessions. Seven vendors′ lunch seminars were presented by global companies. Ten short courses were arranged with 164 participants in total.

Four distinguished awards (Robert Kellner Award 2019, Heinrich Emanuel Merck Award, EuChemS Lecture Award and DAC-EuChemS Award) along with 29 poster and young scientist oral presentation awards were handed out during the conference. At Euroanalysis 2019, young scientists were also encouraged with special scientific activities like Poster Pitches and Young Scientist Oral Sessions sponsored by Springer, Elsevier and Amgen Pharmaceuticals.

The conference had 15 plenary and 40 keynote speakers giving lectures about a wide range of topics – from a historical perspective of education and chemical analysis to omics studies and sensor technologies as well as new techniques. 163 lectures and 317 poster presentations resulted in a very attractive program, which covered practically all areas of analytical sciences. In accordance with the intentions expressed at the foundation of the Euroanalysis series, the conference gave an excellent overview of the advances in the various areas of analytical sciences and stimulated communication between analytical chemists working in quite diverse fields. Hence, there is an obvious need to continue to take care of research and education in analytical chemistry, and to follow current trends and implications within the subject, as well as in cross-disciplinary efforts where analytical chemistry plays a significant role. One special forum for discussing research and education in analytical chemistry was included in the Euroanalysis XX conference.

This fact was also reflected by the various plenary lectures including “The metamorphosis of analytical chemistry: chemical analysis in the 21st century” (Freddy Adams), “Probing ligand binding to native membrane receptors in physiologically relevant conditions using AFM” (David Alsteens), “Mechanisms of colorimetric sensors and nanoprobes for characterizing antioxidant and nitroenergetic substances” (Mustafa Resat Apak), “A short history of analytical chemistry in Turkey” (O. Yavuz Ataman), “Analytical approaches in the metabolomics workflow” (Coral Barbas), “New strategies for nanostructured electrochemical sensor and biosensor platforms” (Christopher Brett), “Analytical challenges in separation, enrichment and identification of peptides and amino acids: a piece in the puzzle of the bioactivity of protein derivative” (Ana Laura Capriotti), “Recent developments in enantioselective analysis of chiral compounds” (Bezhan Chankvetadze), “Green foodomics: new discoveries in a long journey” (Elena Ibañez Ezequiel), “Multiplexed and sensitive bioanalysis using SERS and SESORS” (Karen Faulds), “Graphene-based biosensors” (Arben Merkoçi), “Development and application of matrix compatible coatings for clean selective enrichment from complex samples: why smaller is better in extraction” (Janusz Pawliszyn), “Porous polymer monoliths: a universal tool in chromatography” (Frantisek Svec), “Single-molecule sensing of clinical biomarkers” (Luisa Torsi), and “Smart polymer biosensors” (Anthony P.F. Turner). The wide range of technological, educational, new trends and thematic issues of the scientific program was also covered by four parallel sessions starting with well-received keynote lectures.

Obviously, modern analytical sciences not only aim to provide qualitative and quantitative results, but also focus on developing new strategies for efficient problem solving, as well as on interpretating the data obtained through state-of-the-art techniques. The current trend to divide the analytical sciences into a variety of sub-disciplines may be disadvantageous for further development in this field. Therefore, wide-ranging conferences such as Euroanalysis had and will have their place alongside more specialized meetings with the aim of communicating a more complete picture of the current analytical sciences.

Chemometrics is very often used in the data treatment of complex datasets and also offers wide possibilities in signal treatment to improve the detection power of a large number of analytical methods. In general, both methods and problem-oriented contributions created an excellent atmosphere for exchange of knowledge in analytical sciences. All that is reflected in the papers presented in Euroanalysis XX and this topical collection.

Four of the aforementioned lecturers were awarded prestigiously within Euroanalysis XX: The Robert Kellner Lecture Award 2019—established by the Division of Analytical Chemistry of EuChemS and sponsored by Springer in memory of the efforts and achievements of the late Robert Kellner from Vienna University of Technology towards the consolidation of analytical chemistry in Europe—was presented to Luisa Torsi (University of Bari), whose lecture was on "Single-molecule sensing of clinical biomarkers". The Heinrich Emanuel Merck Award 2019 was presented to David Alsteens (Catholique Leuven University), whose lecture was entitled as "Probing ligand binding to native membrane receptors in physiologically relevant conditions using AFM". The EuChemS Lecture Award was presented to Anna Laura Capriotti (University of Roma). Her lecture was entitled "Analytical challenges in separation, enrichment and identification of peptides and amino acids: a piece in the puzzle of the bioactivity of protein derivative". The DAC-EuChemS Award was presented to Freddy Adams (University of Antwerp), who gave a lecture entitled "The metamorphosis of analytical chemistry: chemical analysis in the 21st century" and this award sponsored by Springer.

A forthcoming challenge is the development of analytical methods enabling sensing of the markers or detection of targeted sensing biomolecules in cell, tissue, or organism. Bioanalytical topics attracted many researchers from analytical laboratories and outside the community of analytical chemists. Some of the presentations at Euroanalysis XX in the special editorial session included some of the most prominent scientists in the biosensor field. The editors of Elsevier "Biosensors and Bioelectronics" represented their special area, and the speakers were fully sponsored by their respective editorials.

For instance, Anthony P. F. Turner, contributed with a speech entitled "Glucose sensors for the management of diabetes". Overall, the contributions ranged from glucose sensors, nanobiosensors, plasmonic sensors, to enzyme sensors in the electroanalytical, optics area. The following editors also gave speeches in this session; Arben Merkoci "Paper-based nanobiosensors", Loïc Blum "A versatile multielectrode platform for drug discovery and enzyme screening", Aldo Roda "Smartphone-based biosensors: present status and perspectives" and Jiří Homola "Plasmonic biosensors: present and future".

Euroanalysis XXI will take place in Nijmegen, The Netherlands, in September 2021 and will be organized by the Royal Dutch Chemical Society. The preparations for Euroanalysis 2021 in Nijmegen (The Netherlands) have already been started by Lutgarde Buydens in order to continue this successful series of conferences.

The strongest impression collected from the Euroanalysis conference program and the articles published in this topical collection is the broad spectrum of analytical chemistry and its effects on different areas. Concerning this collection, I am very grateful to the reviewers for their thorough and on-time reviews of the manuscripts and to the Analytical and Bioanalytical Chemistry editorial team for their great cooperation.

Sibel A. Ozkan has been working as Full Professor of Analytical Chemistry at Ankara University, Faculty of Pharmacy, since 1986. She is an active member of the European Chemical Society-DAC on behalf of the Turkish Chemical Society. She is a member of the European Pharmacopoeia-EDQM-Chromatography Section. She is a member of PortASAP - European network for the promotion of portable, affordable and simple analytical platform: Core group of Cost Action CA 16215, Working Group 4. She has been involved in several analytical chemistry projects related to LC methods, separation techniques, chiral separation, drug analysis in dosage forms and biological samples, electrochemical biosensors, nanosensors, DNA biosensors, enzyme biosensors, environmental sensors, method development and validation of drug assays. She has published more than 285 original and review papers, edited of 6 scientific books from HNB Publishing (2012), Springer (2015), Bentham (3 Volumes, 2018–2019), Elsevier (2019) and authored than 35 book chapters over the years (for Elsevier and Springer). She received the Ankara University Encouragement Award (2003), Turkish Pharmacists Association-Scientific Award (2008), Supervisor of The Best Ph.D. Thesis Award (Health Sciences) in Turkey from The Council of Higher Education of Turkey in 2017 and Ton Duc Thang University "Woman in Science 2019 Award" (Vietnam). She is Editor of the Journal of Pharmaceutical and Biomedical Analysis and Regional Editor (Europa) of Current Pharmaceutical Analysis. Besides, she is an editorial board member of Talanta, Chromatographia, Turkish Journal of Chemistry and other journals.