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EDITORIAL

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EuChemS
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Division of Analytical Chemistry

Information from the EuChemS division of analytical chemistry (DAC)

The European Analytical Column is the voice of the Division of Analytical Chemistry (DAC) as a Professional Network of chemical societies and their members working in all fields of analytical sciences within the European Chemical Society (EuChemS). Promotion of Analytical Chemistry as an interdisciplinary field and support to members' activities are two of its main goals. This year we have invited Prof. Günter Gauglitz as Editor of Analytical and Bioanalytical Chemistry to provide also his personal view on the highlights of research published in 2018. We hope you enjoy it!

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DAC-EuChemS activities

One of the main activities of DAC-EuChemS is the promotion of organization of Euroanalysis conference. Every two-years, one of the participating scientific chemical societies will host Euroanalysis, with active involvement of local scientists in the organization. Euranalysis conferences, as the anchor events, usually gather more than 700 participants in Europe concerning general aspects of Analytical Chemistry. . This year the Turkish Chemical Society will organize Euroanalysis XX in Istanbul (http://euroanalysis2019.com/) from 1 to 5 September with two chairs, Prof. Dr. Sibel A. Özkan (Ankara University) and Prof. Dr. Mehmet Mahramanlioğlu (Istanbul University). The venue will be located in the campus of Istanbul University, which is in the heart of the city centre and close to the road links and public transport. Euroanalysis XXI is already scheduled for 2021, taking place in the beautiful city of Nijmegen, Netherlands.

Other ongoing activities of DAC are performed within Study Groups. These include "Bioanalytics", "Chemometrics", "Education", "History", "Quality Assurance", and "Nanoanalytics" and also the recently created Task Force "Electroanalytical Chemistry". Please check the DAC-EuChemS website for their reports (https://www.euchems.eu/divisions/analytical-chemistry/) and feel free to contact any of the Heads of the Study Groups or Task Force in order to have more information or to participate in their activities.

One of DAC-EuChemS objectives is to support its delegates on the organization of local events open to the international community through dissemination of the event within the Professional Network. In 2019 we have scheduled the 2nd Cross-Border Seminar on Electroanalytical Chemistry (CBSEC), 10–12 April 2019, Ceske Budejovice, Czech Republic (http://www-analytik.chemie.uni-regensburg.de/CBSEC/index_elach.htm) and the 15th International Students Conference "Modern Analytical

Chemistry”, 19–20 September 2019, Prague, Czech Republic (https://web.natur.cuni.cz/analchem/isc-mac/). In 2018 DAC-EuChemS has supported ANALÍTICA – 2018 (26–27 March, Porto, Portugal), ESEAC 2018 (3–7 June, Rodos, Greece), 4th International Conference on Analytical Chemistry (1–3 September, Bucharest, Romania), and 14th International Students Conference “Modern Analytical Chemistry” (20–21 September, Prague, Czech Republic).

Collaboration with other Professional networks within EuChemS is also sought. In particular, DAC-EuChemS will host the session “Analytical Chemistry in environmental monitoring and chemistry studies” within the programme of ICCE 2019 – 17th International Conference on Chemistry and the Environment, organized by the Division of Chemistry and the Environment (DCE-EuChemS) and the Association of Greek Chemists in Thessaloniki next June (16–20, https://icce2019.org/). Prof. Paul Worsfold, invited lecturer, will receive the DAC Tribute for his dedication and service to DAC-EuChemS. Likewise, DCE-EuChemS will host a dedicated session in Euroanalysis XX, entitled “Environmental Analysis”.

Highlights of research in analytical chemistry - 2018

Screening the literature of the past year (2018), there are publications covering the usual fields or identify highlighted and emerging applications, sometimes in combination with interesting innovative methodological developments. Any selection is personal, but the number of citations of a given paper can indicate the interest the publication has received in the analytical community.

Mass spectrometry is one of most commonly used technique, especially in the area of proteomics or lipidomics [1]. As a MALDI technique, it is used for low-molecular weight compounds [2]. High interest achieved emerging advancements and future insights for MS imaging [3]. In general, imaging techniques have found increasing interest in methodological development and modern applications. Spectroscopic imaging at a nanoscale is reviewed with regard to technology and recent applications [4]. A classical spectroscopic method is surface enhanced Raman spectroscopy (SERS), which gained extreme interest in environmental analysis, bioanalysis and screening tissue even during operations. This success is driven by ground-breaking development in instruments and data processing. Recent developments towards quantitative evaluation [5], the combination with fluorescence measurement [6] or imaging result in high citation rates. SERS is used in environmental analytics for the detection of heavy metals. These heavy metals ions are also identified and detected using electrochemical methods in environment [7] where analytics in water plays a fundamental role regarding contaminants and upcoming antibiotics [8]. Interesting is also the measurement of mycotoxins [9] and their tracking in food using LC-MS/MS [10]. The microplastic pollution of water is an increasing issue worldwide, therefore a review on the challenges for analytical chemistry regarding the analysis of microplastics in the environment has a high citation rate [11].

For read-out the use of fluorescence is typical in sensor-based measurements, where search probes are used for imaging and detection even in biological systems [12]. Frequently, modified nanoparticles are used e.g. for upconversion [13] and ratiometric detection [14]. These nanoparticles might be used for signal amplification which is of interest especially for medical applications [15] or as magnetic nanoparticles [16] which are also useful for separation techniques and sensor applications. Especially gold nanoparticles are used in lateral flow immunoassays as a point-of-care diagnostic tool [17] as quantum dots and they are also used in ionic liquids [18]. In the publications with the highest citation rates, these ionic liquids demonstrate an increasing number of applications; they are used e.g. for extraction [19, 20] or as an ionic liquid carbon paste on an electrode for sensitive electrochemical immunoassays [21].

It turns out that papers dealing with extraction applications and issues are highly cited as demonstrating the advantage of microextraction and perspectives for the future [22]. Furthermore extraction is described in combination with graphene and carbon nanotubes as solid-phase extraction sorbent [23] as well as a magnetic dispersive micro solid-phase extraction in a reactor for the determination of pollution in baby food samples [24]. Recent trends and future perspectives of the combination of extraction and micro-extraction techniques is also discussed [25].

In the field of chromatography ionic liquids are used, also [26]. Separation of chiral compounds is gaining interest [27]. Multidimensional gas chromatography allows 2-dimensional separations, will require chemometrics and can be combined with MS [28].

Molecular imprinted polymers (MIP) can be used in separation columns and are modern recognition elements in sensors. Last year, using magnetic MIPs the separation in biofluidic samples as a mild and green approach has been discussed [29]. One finds especially its applicability to electrochemical sensing in literature [30, 31]. Among new sensors, wearable sensors are of special interest. Thus, the challenges and prospects have been reviewed recently and are frequently cited [32]. Biomedical applications are provided for wearable and implantable sensors [33]. Even the never-ending story of glucose sensors is reviewed with regard to wearable non-invasive epidermal glucose sensors [34]. In environmental analysis and bioanalysis, colorimetric detection of H_2O_2 is focused especially on the use of nanocomposites [35, 36].

In sensing besides the large variety of optical and electrochemical developments, the last year presents special electrochemical luminescence immunosensors [37] or photoelectrochemical immunosensors where near-infrared light excites core-core-shell nanospheres with upconversion [38]. Optimization of microfluidics is essential. Thus, the microfluidic paper-based analytical devices are reviewed [39]. Microfluidic technologies for cell-to-cell interaction [40] are discussed as well as technologies for single-cell analysis [41].

Since the number of citations of an article depends on its time of publication in 2018, the presented numerously cited papers can present only the current status. Nevertheless, summarizing all top analytical journals, manuscripts in the area of bioanalytics considering new extraction approaches, demonstrating new sensor applications, and going from single-spot to imaging techniques give an idea which topics are upcoming and find an increasing interest in the analytical community. Chemometrics and data mining are included in an increased number of papers. Nano- and micro-plastics are in the focus of the society and accordingly papers dealing with their analytics are of high interest. In addition the classical topics of hyphenated techniques applied especially to omics, search for biomarkers with multiplexed analysis, multidimensional separation using magnetic nanoparticles or capillary electrophoresis are considered to be of continuous interest.

Finally, the Steering Committee of DAC will be happy to receive input for additional activities. Feel free to contact one of the following persons: Slavica Ražić, University of Belgrade, Serbia (Chair), Marcela Segundo, University of Porto, Portugal (Secretary), Jiri Barek, Charles University, Czech Republic (Treasurer), Charlotta Turner, Lund University, Sweden, Sibel A. Özkan, Ankara University, Turkey, Christian Rolando, University of Lille, France, and Martin Vogel, University of Münster, Germany.

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