Analytical and Bioanalytical Chemistry (2019) 411:4231–4234
https://doi.org/10.1007/s00216-019-01934-8

EDITORIAL

Meet the Guest Editors

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Published online: 8 June 2019

For the fifth time, a special issue featuring Young Investigators in (Bio-)Analytical Science has been prepared by an international team of four leading scientists. Thanks to their commitment and dedication, as well as additional support by members of our International Advisory Board, this unique collection of articles authored by rising stars in analytical sciences was complied.

We invite you to meet the Guest Editors of this special ABC issue by reading this virtual interview and the following bibliographic portraits.

Thank you for acting as guest editors for the 2019 edition of our famous issue series. We very much appreciate your dedication to make this issue a success story.

WW: It is my honor and pleasure to serve my community. Honestly I have learned a lot from this valuable opportunity and I deeply appreciate that.

You invited rising stars representing the diversity in (bio-)analytical chemistry. What is unique about this young investigators generation?

KL: This generation had the good fortune to grow up and study in a (research) world that has becomes more and more globally connected. Young researchers appreciate and highly benefit from internationality, mobility and interdisciplinarity in diverse research teams.

WW: My general observation is that this young investigators generation pays more attention to the development of advanced (and often novel) analytical technologies and methods, in addition to exploring the new applications (analytes and samples for example) of established methods.

EB: The young investigators in this generation have to be very creative, as they need to expand on the techniques developed before them or use this knowledge to enable new capabilities. The automation and computational resources available also provide many exciting opportunities for rapidly acquiring an enormous amount of experimental data, processing it in a short timeframe, and then connecting it with results from other areas to increase our understanding of complex environmental and biological systems.

FR: The invited young investigators that accepted to take part to this special issue all come from very diverse backgrounds that range from pure analytical chemistry to, biochemistry, materials chemistry, biotechnology and physics. I believe that this diversity is what makes (bio-)analytical chemistry so interesting and exciting: the possibility to apply a range of know-how and different backgrounds to reach the same scientific objective and find new sensing methods and strategies that could be one day useful.

What are the opportunities for your generation in analytical and bioanalytical chemistry?

FR: Because they are involved in a very applied discipline, analytical scientists can have many opportunities. Apart from academia, which is

Published in the topical collection *Young Investigators in (Bio-)Analytical Chemistry* with guest editors Erin Baker, Kerstin Leopold, Francesco Ricci, and Wei Wang.

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obviously a very difficult and unpredictable path to follow, they are constantly requested in research centers, industries and control agencies.

KL: The open-minded atmosphere will help to answer interdisciplinary questions.

WW: Scientific and technical demands in life science, environmental science and materials science require advanced analytical techniques with sufficient temporal and spatial resolutions for studying more and more heterogeneous and dynamic systems. Addressing these challenges requires in-depth interdisciplinary collaborations, which also bring the opportunity for analytical chemists to think and to behave as problem-solvers instead of data-providers.

EB: In my field of mass spectrometry, there are so many new capabilities present that were just beginning or not even possible in the late 1900s. These capabilities have led to novel research projects in areas such as single-cell analyses; rapid molecular tissue screening in real time; and integration of omic data (e.g. the capability to combine genomic, transcriptomic, metabolomic, lipidomic, glycomic, proteomic and exposomic information from the same sample). These projects (and others) are providing new insight into what we previously thought we knew and enabling many opportunities for novel research projects.

How does your generation respond to the *publish or perish* "pressure", do you think there is a different expectation or an adjusted way to publish scientific results?

WW: This generation is indeed facing a higher level of *publish or perish* pressure due to the revolutions in both scientific publishing and academic evaluations. The field of analytical chemistry is highly diversified including both very fundamental efforts and very practical improvements. For the former category, publishing scientific results in a respected professional journal like Analytical and Bioanalytical Chemistry is certainly encouraged and necessary. For the latter category, demonstrating the value in the market is an alternative, sometimes more important, choice.

FR: This is becoming a serious problem that is affecting the way younger researchers approach scientific problems and as a result may eventually lead to incremental research and the avoidance to tackle more challenging and long-term scientific projects.

KL: Maybe it is wishful thinking, but I have a feeling that slowly, very slowly things begin to change in this regard.

EB: I feel that we still want to publish quality papers that others will use or cite. I also believe that we would rather perish than publish garbage.

How do you best respond to this pressure, what is your advice to your students?

KL: I am convinced that quality (instead of quantity) will be rewarded over the long term. This we should remember and uphold on any occasion possible, even though this is more difficult for young scientists.

EB: While there is a lot of pressure to publish, there is also a lot of pressure to do good science. I believe that you learn something from every experiment, even when the results are inconclusive. My goal is for my group to do the best science possible and feel like no experiment is a failure, even if it is not publishable. I also feel it is important to learn something from every study, especially what does not work.

FR: My advice to the PhD students I supervise is to always try to publish only novel and high-impact results and avoid to publish incremental papers. I prefer a student with few strong papers than one with many low profile publications.

Looking back to 2001 when ABC was founded, the most challenging question was "identification". What is this question for analytical chemists nowadays?

EB: I believe that identification is still one of the most challenging questions for analytical chemists as many studies still have identification challenges. For example, in small molecule analyses, many of the molecules have the same elemental makeup but just slight structural differences making their identification extremely difficult. Another example would be proteomic studies where the type and exact placements of post-translational modifications is extraordinarily difficult.

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interdisciplinary collaborations, which also bring the opportunity for analytical chemists to think and to behave as *problem-solvers* instead of *data-providers*.

FR: One of the most challenging questions these days I guess could be "discrimination". The possibility to measure a specific analyte in a complex sample without the need for pre-treatment steps is of paramount importance to make analysis of any kind rapid and reliable.

How would you describe the role of analytical chemists to solve this question?

FR: Luckily, this field is getting more and more interdisciplinary and this will surely help to solve not just the "discrimination" problem but many other analytical challenges. I believe that the best we can do is to open our field to diverse expertise without limiting ourselves to the "analytical chemist" profile.

EB: Analytical chemists have made great strides in providing new identification capabilities such as advanced chromatography methods, mass spectrometry fragmentation approaches, labeling strategies, and separation techniques that provide even better resolving power than previously available. I am excited this issue emphasizes some of these new capabilities and hope to see many more evolve in the coming years.

How would you define the role of a journal like ABC in meeting these new challenges?

EB: I feel that the peer review system is the best way to pass along new methods and techniques that are high quality and will be of broad interest to the scientific community. Thus, the reviewers and editors of ABC will be instrumental in the task of quality method and technology transfer.

FR: ABC is surely contributing, together with other journals, to setting high standards for publication in this field and as such it has an important role to reach the new challenges that are ahead of us.

Thank you all for sharing your thoughts with us!

Erin S. Baker is Associate Professor in the Department of Chemistry at North Carolina State University. Her research group is utilizing informatics tools and multi-omic analyses to rapidly evaluate numerous samples in a short time period and connect this molecular information with phenotypic data. Her lab utilizes a variety of solid phase extraction techniques, chromatography methods, ion mobility spectrometry assays and mass spectrometry instruments to attain the molecular information needed for a better understanding of the environmental and biological systems being studied.

Kerstin Leopold is Professor of Analytical Chemistry and Deputy Director of the Institute of Analytical and Bioanalytical Chemistry (IABC) at Ulm University, Germany. Her research field is the development of new methodologies in trace and ultra trace metal analysis, speciation and nanoanalysis. Thereby various techniques of separation, preconcentration, and atomic spectrometry are applied. Moreover, nanoparticles play an important role, either as a tool to enhance analytical procedures, or as target analyte.

Francesco Ricci is Associate Professor at the Chemistry Department of the University of Rome, Tor Vergata. His research interests include functional DNA nanotechnology, biosensing, and synthetic biology. He was awarded an ERC Starting (2013) and Consolidator (2019) grant, the inaugural ACS Advances in Measurement Science Lectureship Award (2017) and the Heinrich Emanuel Merck Award for Analytical Science (2017).

Wei Wang is Professor at Nanjing University. He received his BS in 2004 and PhD in 2009, both from the University of Science and Technology of China (USTC). He pursued postdoctoral studies at Arizona State University from 2009 to 2013 before joining the faculty of Nanjing University in December 2013. He received support from the Thousand Young Talents Program (2013) and the National Natural Science Foundation of China for Excellent Young Scholars (2015). He also received the Young Chemist Award from the Chinese Chemical Society in 2017. His current researches involve advanced optical microscopy for single-cell imaging, nanoelectrochemistry, and single-molecule detection.