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7th International Conference and Exhibition on

Analytical & Bioanalytical Techniques

September 28-30, 2016 Orlando, USA

Keynote Forum

(Day 1)

Chen-Zhong Li, J Anal Bioanal Tech 2016, 7:5(Suppl)
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Chen-Zhong Li
Florida International University, USA

Electronic micro devices for neuron activity recording and mapping

Understanding and controlling the interface between neuronal cells, neuronal network and electrical devices is vital to both biological science and technology. Recent developments in the field of *in vitro* neuron mapping focus on the development of optical and electrochemical strategies for either single neuron cell/neuron measurement or artificial neuronal networks/brain slices mapping. To mimic *in vivo* neuronal networks and to elucidate the mechanisms of computation, spontaneous and elicited electrical activity needs to be monitored, and multiple simultaneous recordings are required for monitoring individual unit and collective network activity. In this way, both individual cells and cell networks can be scrutinized in order to understand how the changes in single unit activity and functionality are. In the present study, we developed a large-scale integration based amperometric sensor array system for electrochemical bioimaging and throughput sensing of dopamine expression from three-dimensional (3D)-cultured PC12 cells upon dopaminergic drugs exposure. It has been shown that individual cells behave differently from the population even under the identical conditions, as a complementary study, we also explore the possibility of single cell-on-chip based analytical technique which can collect real-time change in cell physiology by measurement of cell exocytosis, i.e., release of neurotransmitters, in a neuronal model cell line, i.e. PC12 cells. The study of single cell dynamics could help us better understand the complex processes, such as, neurotransmitter kinetics, ion channel functions, and cell communications, single cell analysis can be an equivalent and complementary strategy to existing approaches.

Biography

Chen-Zhong Li is the Director of the Nanobioengineering/Bioelectronics Laboratory at Florida International University, USA. The impact of his work is documented in 9 granted patents, more than 100 peer-reviewed journal papers and over 140 presentations at national/international conferences including more than 90 keynote/invited lectures and seminars. He is the Associate Editor of 3 SCI indexed scientific journals and received numerous awards and honors.

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Joon Myong Song, J Anal Bioanal Tech 2016, 7:5(Suppl)
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Joon Myong Song

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Quantitative multicolor single cell imaging cytometry for high-content drug screening based on nanoprobes

Cell-based assays are essential to assess drug-mediated toxicity and cellular responses and to discover new chemical entities in the early phase of drug discovery. Cellular assays are usually based on either imaging or spectroscopic analysis. However, quantitative image-based cellular assays are still a major challenge for drug screening. In this work, quantitative multivariate image-based high-content cellular assays (HCAs) are reported. These assays were achieved using acousto-optical tunable filter and quantum dot probes. This approach is based on uniform threshold intensity distribution (TID) through quantitative multispectral and multicolor imaging cytometry. This method is capable of performing wide arrays of automated, quantitative, and multivariate cellular assays via single-cell monitoring over time. The approach of employing region selection to slightly defocused, background-nullified and threshold images facilitated rapid quantitative measurements during cellular assays by providing uniform TID over the objects (cells), necessary for automated quantitative analysis. This high-content cellular imaging method offers imaging and quantitative analysis of targeted cellular moieties, which can be further applied to various cellular assays in combination with snapshot methods. Application of HCA to organ-specific cell models provides deeper biological information suitable for better decisions on progressing compounds. Gaining a deep understanding of the mechanisms underlying these cellular responses is valuable before a series of lead compounds are progressed to time-consuming and expensive animal tests. This work has great significance for the exploration of various cellular response involved in drug efficacy and toxicity in the process of drug discovery.

Biography

Joon Myong Song has received his PhD in 1997 at Kyushu University, Japan. He has worked as a Postdoctoral Research Fellow from 1998 to 2004 at Iowa State University, Brookhaven National Laboratory and Oak Ridge National Laboratory in United States. Presently, he is a Professor and Head of Department of Pharmacy at College of Pharmacy, Seoul National University in South Korea. His research area includes multifunctional nanoparticle for diagnosis and therapy and high-content cell-based drug screening and diagnosis using hyper-multicolor cellular imaging. He has published 90 peer reviewed papers in the top journals, 7 book chapters and 10 patents.

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Miroslav Ryska
QUINTA-ANALYTICA, Czech Republic

Can matrix effect in LC/MS or LC/MS/MS assay be avoided or fully compensated?

The source of the matrix effect as a consequence of analyte ions suppression or ions enhancement must be sought in the presence of unknown impurities from matrix. These impurities can be regarded as Brønsted bases or acids. They are participating in the complex ionization process in parallel or competing ion-molecular reactions. Not only impurities from extracts but impurities adsorbed in the ion source and/or in the analytical system may play an important role in the extensively understood term "matrix effects". These adsorbed substances cannot be fully removed from the system by any cleaning procedure. On the other hand, this effect may be effectively used in the sensitive method of the determination of some drugs (e.g. lacidipine). To fully compensate for the negative impact of the "matrix effect", use of isotopically labeled internal standards (isotope dilution technique) proved to be the only effective technique. This applies especially to LC/MS/MS determination of drugs and their metabolites in complex extracts of biological matrices. The isotope dilution technique is successful regardless of the method of purification, the ionization technique (APCI or ESI in both positive and negative ion modes), and the type of the equipment used. In addition, the quality of isotopically labeled internal standards (with respect to the kinetic isotope effects dependent on the number of deuterium atoms present) is not crucial either. The isotope dilution technique proved to be 100% effective for the compensation of matrix effect influences in 132 analytical methods developed and validated. The strict requirements of EMEA guidelines to investigate different plasma sources for the assessment of the matrix effect in the analytical method validation are discussed further within this context.

Biography

Miroslav Ryska has completed his under-graduate degree from Charles University, MS in Physical Chemistry from Moscow State University and PhD from the Institute of Macromolecular Chemistry of Czechoslovak Academy of Sciences. From 1961 to 1978, he has worked at the Institute of Macromolecular Chemistry of the Czechoslovak Academy of Sciences. From 1978 to 1997, he has worked as a Researcher in the field of MS and its application in research of metabolism and pharmacokinetics of drugs at the Research Institute for Pharmacy and Biochemistry in Prague. He has written more than 100 publications mainly on the topic of mass spectrometry, trace analyses, analyses of drugs, metabolites and quantitative analysis. In the 1990's, he was an Editor of two international journals, *The Journal of Mass Spectrometry and Rapid Communication in Mass Spectrometry*. He has founded Quinta-Analytica s.r.o. in 1997 and currently, he is the Vice President of Quinta-Analytica.

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Peter J Baugh
Markes International Ltd, UK

Comprehensive insights into tobacco smoke using TD-GCxGC-TOF MS with tandem ionization

The hazardous constituents of cigarette smoke have attracted considerable attention lately, especially with increasing regulation around the world limiting or banning smoking in public places and even in private cars if children are present. From an analytical perspective, however, there is much that remains to be learnt about the composition of cigarette smoke; because of its high degree of complexity-tobacco smoke is thought to contain thousands of components across multiple chemical classes and wide concentration ranges. Comprehensive two-dimensional gas chromatography (GC×GC), when coupled with time-of-flight mass spectrometry (TOF MS), has been shown to provide improved chemical fingerprinting of complex samples in areas of study as diverse as petrochemical analysis and fragrance profiling. However, commonly-used thermal modulation devices are unable to successfully modulate the most volatile components. In this study, we use thermal desorption (TD) for collection and analysis of whole cigarette emissions, and couple it with flow-modulated GC×GC-TOF MS, to enable the constituents of whole smoke to be routinely and confidently sampled, separated and identified. The use of novel tandem ionization is also harnessed to increase the analytical resolution of the system, by providing both reference-quality 70 eV spectra and soft electron ionization (EI) spectra simultaneously in a single analysis. The complementary soft EI spectra provide a powerful means of identifying compounds that exhibit similar mass spectral characteristics (or extreme fragmentation) at conventional 70 eV energies, but without the inconvenience typically associated with conventional soft ionization techniques.

Biography

Peter J Baugh is currently the Environmental and Food Analysis Special Interest Group Leader for British Mass Spectrometry Society. He has published over 70 papers in a variety of Radiation and Environmental fields and in respected journals.

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Peter J Baugh

Markes International Ltd, UK

Advances in the techniques of multi-dimensional and comprehensive chromatography, and when coupled with mass spectrometry

Part 1 of this keynote presentation summarises the principles of two dimensional gas and liquid chromatography (2DGC and 2DLC) and briefly introduces the theory accounting for the increase in separation resulting from a greater peak capacity than for the one dimensional (1D) mode. The advance in the techniques from multi-dimensional to comprehensive chromatography is discussed. The more recent development of multi-dimensional chromatography ion mobility mass spectrometry receives a mention to highlight the added dimension of molecular size and shape (molecular collision cross section) as an enabling tool for increasing component separation and peak capacity. Although both the techniques of 2DGC and LC are considered the focus is on 2DGC, principally when coupled to mass spectrometry

Biography

Peter J Baugh is a visiting professor at the University of Chester, UK, and he is currently the Environmental and Food Analysis Special Interest Group Leader for The British Mass Spectrometry Society with a responsibility for organizing meetings for this group. He has published over 75 papers in a variety of radiation and environmental fields and in respected journals.

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