CECE06

Third multidisciplinary meeting covering all aspects of modern bioanalysis

November 13 -14, 2006

Institute of Analytical Chemistry

Academy of Sciences of the Czech Republic, Veveří 97, 602 00 Brno

www.iach.cz

Organizing Committee: F. Foret, L. Křivánková, K. Klepárník, M. Mikešová

Monday, November 13, 2006

9:45
CECE2006 Opening
František Foret, Institute of Analytical Chemistry, Brno

10:00
Open tubular capillary electro-chromatography – versatile technique in human lipoprotein nanoscale studies
Marja-Liisa Riekkola, Laboratory of Analytical Chemistry, Department of Chemistry, P.O. Box 55, 00014 University of Helsinki, Finland

10:30
Miniaturized separation techniques coupled with mass spectrometry: fundamentals and applications
Zeineb Aturki, Giovanni D'Orazio, Anna Rocco, Salvatore Fanali
Institute of Chemical Methodologies, CNR, Area della Ricerca di Roma 1; Rome, Italy

11:00
Detection of Avian Influenza virus by a Palm-sized RT-PCR system
Pavel Neuzil, Institute of Bioengineering and Nanotechnology, 31 Biopolis Way, The Nanos, #04-01, Singapore 138669.

11:30
Free-flow electrophoresis using microchips
Dirk Janasek, ISAS — Institute for Analytical Sciences, Bunsen-Kirchhoff-Str. 11, D-44139 Dortmund, Germany

12:00 – 13:25
Lunch Break

13:30
In the search of tools for separation science and beyond
Miroslav Macka, Marie Curie Fellow and Excellence Team Leader, School of Chemical Sciences, Dublin City University, Glasnevin, Dublin 9, Ireland

14:00
Electrochemistry of nucleic acids and proteins: tools for biomedicine
Emil Paleček, Institute of Biophysics, Acad. Sci. CR, 612 65 BRNO, Czech Republic

14:30
Characterization of natural organic binding media in museum object by capillary electrophoresis
Ernst Kenndler, Institute for Analytical Chemistry, University of Vienna, Währingerstr. 38, A 1090 Vienna, Austria

15:30
Chirally functionalized silica and organic polymer monoliths for enantioselective CEC
M. Lämmerhofer[a], B. Preinerstorfer[a], D. Lubda[b], W. Lindner[a]
[a] Christian Doppler Laboratory for Molecular Recognition Materials, Institute of Analytical & Food Chemistry, University of Vienna, Waehringer Strasse 38, A-1090 Vienna, Austria; [b] R&D Biochemistry and Separation , Merck KGaA, Frankfurter Strasse 250, Darmstadt, Germany

Tuesday, November 14, 2006

9:30
ETD: Electron Transfer Dissociation, a fragmentation technique that preserves post-translational modifications
Michal Boháč, Scientific Instruments Brno, spol. s r.o., Havlíčkova 86, 602 00, Brno, Czech Republic. Bruker Daltonics Exclusive Representative in CZ and SK,

9:50 SYNAPT™ High Definition Mass Spectrometry™ – a new dimension in IMS-MS
Miroslav Procházka, Waters Gesellschaft m.b.H., Psohlavců 43, 147 00 Praha 4

10:10 Mass spectrometric strategy for structural mapping of endogenous metabolites
Robert Mistrik, HighChem, Ltd., Čajakova 18, 81105 Bratislava, Slovakia

10:40
G-quartet affinity capture of DNA binding proteins for MALDI-TOF analysis
A. Guttman and A. Szilágyi, Horvath Laboratory of Bioseparation Sciences, Univ. Innsbruck, Austria

11:10
CE- MS hyphenated approaches towards characterization of glycopeptides
Andreas Rizzi, Alexander Plematl, Sabine Amon, Thomas Hrebicek, Roman Ullmer, Michael Lechner, Alexandra Seifner, Institute of Analytical Chemistry, University of Vienna, A-1090 Vienna

11:40
Transferring modern analytical technologies from research into practical applications in a startup biotech company
Marek Minarik, Genomac International, s.r.o., Prague, Czech Republic

12:10 – 13:25
Lunch Break

13:30
NMR of Biomacromolecules: Quo vadis?

Vladimír Sklenář, National Centre for Biomolecular Research, Faculty of Science, Masaryk University, Brno, Czech Republic

14:00 Electrophoresis is a fun
Bohuslav Gaš, Faculty of Science, Charles University, Prague, Czech Republic

Abstracts

Open tubular capillary electro-chromatography - versatile technique in human lipoprotein nanoscale studies

Marja-Liisa Riekkola, Lucia D'ulivo, Jie Chen, Anu Vaikkinen, Yohannes Gebrenegus, Jóse Ruiz Jimenez, Katariina Öörnia and Petri Kovanen[a].
Laboratory of Analytical Chemistry, Department of Chemistry, P.O. Box 55, 00014 University of Helsinki,
Finland, [a] Wihuri Research Institute, Kalliolinnantie 4, FIN-00140, Helsinki, Finland

Microsystems and miniaturized techniques with special nanoscale functions are considered one of the key technologies for future progress in biochemistry, biotechnology and medicine. It is also well-recognized that new bioanalytical techniques are needed to meet the requirements related to the integration of various steps such as reactions/measurements/analysis and detection under different conditions. Full understanding of atherosclerosis at the molecular level requires unraveling of the changes of molecular interactions during atherogenesis. These nanoscale interactions influence the metabolism of the lipoprotein particles in the arterial wall by affecting the interactions of lipoproteins with the components of the extracellular matrix. Further, the nanoscale interactions are critical for the mutual interactions between individual low-density lipoprotein particles leading to either aggregation or fusion of the particles. Evidence from many biochemical studies supports the hypothesis that high-density lipoprotein (HDL) particles protect against the development of athero-sclerotic coronary heart disease due to their role in the pathway of reverse cholesterol transport. Investigations related to the topic are, however, somewhat problematic due to the fact that HDL subpopulations are subject to transformation/remodelling in circu-lation. In this talk the potential of open tubular capillary electrochromatography (CEC) in the clarification of the role of lipoprotein particles in atherogenic processes will be presented. In addition, the implementation of CEC with advanced chemical and molecular concepts for HDL subpopulation studies will be described. The novelty of CEC techniques originates from the utility of human lipoproteins, apoproteins and proteoglycans as biological coating materials.

1. R. Kuldvee, L. D'ulivo, G. Yohannes, P.W. Lindenburg, M. Laine, K. Öörni , P. Kovanen and M.-L. Riekkola,
Anal. Chem. 78 (2006) 2665.
2. G. Yohannes, M. Sneck, S.Varjo, M. Jussila, S. K. Wiedmer, P. T. Kovanen, K. Öörni and M.-L.Riekkola, Anal.
Biochem. 354 (2006) 255.
3. J. Ruiz-Jiménez, R. Kuldvee, J. Chen, K. Öörni,P. Kovanen and M.-L. Riekkola, Electrophoresis (2006), in press.

Miniaturized separation techniques coupled with mass spectrometry: fundamentals and applications

Zeineb Aturki, Giovanni D'Orazio, Anna Rocco, Salvatore Fanali
Institute of Chemical Methodologies, CNR, Area della Ricerca di Roma 1; Rome, Italy

Miniaturized separation techniques have recently become very attractive because they offer a number of advantages over classical ones, for example, reduced chemicals consumption, separation improvements and better sensitivity. It is also very important that they require minute samples, which is very often of primary

importance in biomedical, biochemical and forensic sciences. Miniaturized systems such as capillary electrophoresis (CE), capillary electro-chromatography (CEC), and capillary nano-liquid chromatography (CLC/Nano-LC) allow the separation of complex mixtures with high efficiency in short analysis time. In such microscale systems, absorbance-based detectors such as UV detectors are less sensitive because of the shorter path length. On the other hand the typical low flow rates of the miniaturized systems make easy its coupling with mass spectrometry (MS). The use of these analytical separation techniques coupled to (MS) as detection method can provide important advantages in complex matrices as biological or agrochemical samples because of the combination of the high separation capabilities of the microscale systems and the power of the MS as identification and confirmation method. The coupling of the miniaturized techniques with the mass spectrometer can be achieved with appropriate interfaces which operate with low flow rates. In this communication different CE-MS and nano-LC-MS methods for the separation and analysis of drugs and peptides in biological samples are reported by using suitable nanospray interfaces and emphasize advantages and limitations of the developed methods.

Detection of Avian Influenza virus by a Palm-sized RT-PCR system

Pavel Neuzil, Institute of Bio-engineering and Nanotechnology, Singapore

A compact and economical autonomous real-time polymerase chain reaction (PCR) system will be presented. It is based on a micro-machined PCR chip integrated with a heater and a temperature sensor. One μL of PCR sample inside a 4 μL droplet of mineral oil forms a virtual reaction chamber (VRC). This VRC is placed on a microscope cover slip on the silicon chip mounted on a printed circuit board (PCB). A miniaturized integrated fluorescence system is located underneath the silicon chip, which is capable of detecting the amplitude of a fluorescent signal in a real time. Other PCBs contain analog circuits for the PCR thermal management, fluorescence data processing, microcontroller, and a power supply. The total power consumption is only 3 W, making the system truly portable as a 2 Ah lithium ion battery can power it for up to 12 h. A liquid crystal touch-screen display is proposed to be used as an interface for data entry and output. The whole system is enclosed in an aluminum casing and has a diameter of 100 mm, a height of 60 mm, and a weight of only 150 g. Its performance is demonstrated by the analysis of viral RNA derived from the avian influenza virus (H5N1), which is detected within 20 min. The system is being further developed to be integrated with a sample preparation unit to extract DNA (or RNA).

Free-flow electrophoresis using microchips

Dirk Janasek, ISAS — Institute for Analytical Sciences, Bunsen-Kirchhoff-Str. 11, D-44139 Dortmund, Germany

While in capillary electrophoresis only small volumes can be separated in order to obtain high plate numbers, free-flow electrophoresis (FFE) is more suited for separations in preparative scale due to the continuous operation mode. In FFE, the electric field is applied perpendicular to a hydrodynamic flow through a separation compartment. Thus, all analyte molecules are affected by two velocity vectors (electrophoretic and hydrodynamic velocity) leading to a sum vector which is at an angle to the hydrodynamic flow. This results in a

geometrically two-dimensional separation since the time domain is transformed into a spatial domain. Several separation modes known from CE like zone electrophoresis, isotachophoresis and isoelectric focussing (IEF) can be implemented in FFE. Miniaturized approaches using a chamber of only 200 nL will be presented in the talk. Additionally, a new method of the application of the electric field into the separation compartment by electrostatic induction will be shown.

In the search of tools for separation science and beyond

Miroslav Macka, School of Chemical Sciences, Dublin City University, Glasnevin, Dublin 9, Ireland

What tools do we need in modern separation science and how do we get them? The speaker will introduce briefly his past and current research in the broader areas of separation science and chemical analysis and will comment on the very multidisciplinary nature of modern separation science and the range of tools we need, including new separation materials, detection technologies, separation designs and modeling tools. He will illustrate this using examples from his research including utilization of light emitting and laser diodes as light sources in photometric detectors in capillary electrophoresis and other miniaturized analysis formats such as on the chip and outline his view of their potential in miniaturized chemical analysis.

Electrochemistry of nucleic acids and proteins - tools for biomedicine

Emil Paleček, Institute of Biophysics, Acad. Sci. CR, 612 65 Brno, Czech Republic

Electrochemistry of nucleic acids

Electroactivity of nucleic acids was discovered about 45 years ago (1). For several decades it was a purely academic field. Now it is booming because of expectations that electrochemistry can complement optical detection in DNA hybridization sensors (2). At present electrochemical sensors are available enabling determinations of specific nucleotide sequences, DNA point mutations, etc. in amplified DNA fragments with remarkable sensitivities. Determination of a specific sequence in a genome without DNA amplification remains, however, a challenge.

Electrochemistry of proteins.

Present trends in proteomics and biomedicine require new sensitive methods for the analysis of all proteins. Such electrochemical methods are being developed in the author's laboratory (2). They are applied in studies of a-synuclein involved in Parkinson's and Alzheimer's diseases and in the research of the tumor suppressor protein p53, which plays a critical role in cancer development.

[1] E. Palecek, Nature 188 (1960) 656.
[2] E. Palecek, F. Scheller, J. Wang (Eds.). Electrochemistry of nucleic acids and proteins. Towards electrochemical sensors for genomics and proteomics, Elsevier, Amsterdam, 2005, pp. 789.

Characterization of natural organic binding media in museum object by capillary electrophoresis

Ernst Kenndler
Institute for Analytical Chemistry, University of Vienna, Währingerstr. 38, A 1090 Vienna, Austria

Since ancient times many natural organic materials have been used in artistic and historic works as binders, adhesives, fillers and coatings. The identification of these materials is important not only for a proof of authenticity; for restorers and conservators it is essential to recognize the materials and technologies employed

by artists and craftsmen. For identification and characterisation of the different natural organic binders spectrometric and chromatographic methods are well established. Recently, capillary electrophoresis has been introduced as an alternative technique to receive analytical information about the kind and composition of the binding media used in artefacts. From these, drying oils, animal glues and plant gums are identified from the electrophoretic profiles of the monomers they are built from: long chain fatty acids, shorter chain dicarboxylic acids (the degradation products upon ageing and drying of the oil), amino acids and monosaccharides. This presentation illustrates how capillary electrophoresis serves to identify the binders in "museum objects".

Chirally functionalized silica and organic polymer monoliths for enantioselective CEC

M. Lämmerhofer[a], B. Preinerstorfer[a], D. Lubda[b], W. Lindner[a]

[a] Christian Doppler Laboratory for Molecular Recognition Materials, Institute of Analytical & Food Chemistry, University of Vienna, Waehringer Strasse 38, A-1090 Vienna, Austria; [b] R&D Biochemistry and Separation , Merck KGaA, Frankfurter Strasse 250, Darmstadt, Germany

There is a continuous trend in enantioselective CEC, like in CEC in general, away from packed to monolithic column technologies. In line with that we focussed our resarch efforts on the development of new monolithic capillary columns chemically functionalized with chiral chromatographic ligands having enantiomer recognition capabilities for chiral acids and chiral bases. Various distinct monolith approaches have been pursued: in situ organic polymer monoliths, post-modification of reactive organic polymer and sol-gel derived silica monoliths. The pecularity of our approaches lies in the chiral ion-exchange type selectors. They fulfill both requirements of enantioselective CEC: 1) As a result of the charged ion-exchange site they provide electroosmotic flow (EOF) for a faster co-directional separation in which both EOF and electrophoretic migration are in same direction, and 2) they are the stereorecognition sites for chromatographic distinction between the enantiomers. We utilize dedicated cinchona alkaloid derivatives as anion-exchange selectors for enantiomer separations of acidic chiral solutes, while aminosulfonic acid or aminophosphonic acid derivatives turned out to be effective chiral cation-exchange selectors for basic chiral analytes. The developed columns were fairly robust and allowed the enantiomer separations of reasonably broad spectra of chiral compounds with plate counts up to 250,000 per meter. The intended primary area of application being of pharmaceutical interest is supposed to be the enantiomeric impurity profiling in single enantiomer drugs and other pharmaceuticals. In our laboratory, we use this CEC technology also for the development and screening of new effective chromatographic ligands. In the current presentation, the pecularities, pros and cons of the distinct monolithic column technologies will be outlined and discussed.

ETD: Electron Transfer Dissociation, and fragmentation technique that preserves post-translational modifications

Michal Boháč, Scientific Instruments Brno, spol. s r.o., Havlíčkova 86, 602 00, Brno, Czech Republic - *Bruker Daltonics Exclusive Representative in CZ and SK*

Bruker Daltonics as one of the leaders in the field of mass spectrometry provides complex solutions for various

areas of biochemical, pharmaceutical and chemical analysis. These solutions combine high-tech mass spectrometers with modern tools for sample preparation and bio-informatics software. As for the area of proteomics we offer several substantial solutions using various mass spectrometry techniques starting with hight throughput MALDI-TOF & TOF/TOF systems, going through very fast and reliable ESI-Ion Trap and Hight Capacity Ion Trap systems towards ESI-(qQ)-TOF mass spectrometers giving mass spectra with high resolution and mass accuracy. Modern functional proteomics demands a step beyond protein identification – it is becoming more and more essential to unravel the many modifications proteins undergo triggering their biological activity. The Bruker top-of the line High Capacity ion Trap" - HCT*ultra* PTM Discovery System™ features new dissociation technique – Electron Transfer Dissociation (ETD). ETD is a new protein and peptide fragmentation technique that preserves post-translational modifications (PTMs) such as phosphorylation or glycosylation and enables scientist to look for specific information-rich PTM analysis. This gives the researcher easy access to protein sequencing and simultaneous identification of type and location of various PTMs. ETD MS/MS spectra of peptides can now be collected on-the-fly during LC/MS/MS runs. Due to its non-ergodic nature, ETD typically creates very clean MS/MS spectra with intact PTMs. The new ETD implementation often provides complete amino acid series, without the low-mass cut-off traditionally encountered in ion trap MS/MS. The combination with the superior mass accuracy of the HCTultra enables powerful de novo sequencing capabilities. Using the PhosphoScan™ mode of the HCTultra with ETD offers a unique and powerful system for single run auto-LC/MS/MS/MS CID/ETD experiments specifically for phosphorylation analysis. This contribution will describe technical details about ETD technique and show on real samples its usefulness in the nowadays proteomic analyses.

SYNAPT™ High Definition Mass Spectrometry™ – a new dimension in IMS-MS

Miroslav Procházka, Waters Prague, Czech Republic

Utilising Waters patented Triwave™ technology, the SYNAPT™ High Definition Mass Spectrometry™ (SYNAPT™ HDMS™) system combines high-efficiency, ion-mobility based measurements and separations with high-performance quadrupole, orthogonally accelerated time-of-flight hybrid mass spectrometry.
Waters SYNAPT™ HDMS™ system enables the analysis of samples differentiated by molecular size and shape, as well as mass, to deliver increased specificity and sample definition beyond that achievable by conventional mass spectrometers.
The system is designed for researchers working at the limits of conventional mass spectrometry capabilities who need to further characterize and define their samples, Waters SYNAPT™ HDMS™ system offers unique, enabling IMS-MS functionality.

Mass spectrometric strategy for structural mapping of endogenous metabolites

Robert Mistrik, HighChem Ltd., Bratislava, www.highchem.com

The challenge set by metabolite profiling is the analysis of numerous small molecules anticipated for comprehensive mapping the metabolome of humans and other organisms, the next milestone in biochemical science.

The detailed identification of highly diverse small molecules is a well known bottleneck in chemical, biomedical and pharmaceutical sciences. A novel integrated mass spectrometric approach which takes advantage of the structural continuum and conservation of eukaryotic metabolism will be presented to address this challenge. Comprehensive empirical data collections along with a fragment search technique and an ion fingerprinting method are integrated into this approach. The identified metabolites can be associated with known metabolic pathways and visualized using biochemical software developed-in house.

G-quartet affinity capture of DNA binding proteins for MALDI-TOF analysis

A. Guttman and A. Szilágyi, Horvath Laboratory of Bioseparation Sciences, Univ. Innsbruck, Austria

G-quartets are four-stranded DNA structures formed in vitro by guanine-rich sequences usually occurring in chromosomal telomeres, gene promoter regions, immunoglobulin switch regions and recombination sites. This structural motif is composed of four guanines arrayed in a square planar configuration and can self-assemble in the presence of monovalent cations. Because of their apparent role in controlling gene expression by blocking DNA synthesis, G-quartets are in the focus of recent interest. In addition, their putative involvement in the inhibition of telomerase activity makes them potential targets in cancer research. G-quartets also exhibit high binding affinity for specific target molecules that makes them applicable for affinity capture studies. In this presentation, we describe a gel capillary electrophoresis based method to identify G-quartet forming oligonucleotides. Once identified they are bound to magnetic beads to form an affinity capture surface for target proteins, e.g., transcription factors, which are consequently analyzed by MALDI-TOF-MS.

CE-MS hyphenated approaches towards characterization of glycopeptides

Andreas Rizzi, Institute of Analytical Chemistry, University of Vienna, A-1090 Vienna, Austria

Glycoproteins are known to play a very important role in a variety of biological processes and a majority of proteins occurring in serum and which can serve as disease markers. Whereas "glycoproteomics" (performed in a high-throughput-mode) usually focus on the detection of glycosylation and identification of the corresponding proteins, "glyco-typing" addresses the more detailed analysis of glyco-structures attached to certain proteins particularly under consideration. Both questionings need different analytical strategies. As glyco-typing addresses the site-specific location of the glycans as well as a rough quantitative estimate of the abundances of certain glycan variations, this type of analysis is best done on the level of the glycopeptides obtained by enzymatic digestion. The presentation deals with a comparison of various up-to date approaches for glycopeptide analysis and characterization, discussing strengths and weaknesses of the various procedures. It particularly addresses combinations of CE techniques (CZE and CIEF) hyphenated to single- and multi-stage mass spectrometry in on-line (ESI) or automated off-line (MALDI) mode. Examples are given for which the final results obtained by different techniques are compared and the risks of generating analytical artefacts is discussed.

Transferring modern analytical technologies from research into practical applications in a startup biotech company

Marek Minarik, Genomac International, s.r.o., Prague, Czech Republic

Recent expansion in genome research brought a number of new analytical technologies in the field of life sciences. Although many exciting approaches are presented in scientific environment, only a relatively small fraction subsequently finds its way to practical application in business areas such as commercial diagnostic testing, contract research or product development. Adaptation and validation of new methods and protocols is usually more feasible in a small company. The presentation will document a history of a private research-based startup company and present a transfer of its CE-based methodology from pure research into universal routine use.

NMR of Biomacromolecules: Quo vadis?

Vladimír Sklenář, National Centre for Biomolecular Research, Faculty of Science, Masaryk University, Brno, Czech Republic

During past 20 years nuclear magnetic resonance has evolved into the most powerful spectroscopic techniques, providing detailed information about the spatial structure and internal dynamics of biologically important macromolecules. Recent methodological, as well as technological developments of NMR spectroscopy will be reviewed and future perspectives outlined. Lecture will also present several examples from NMR studies of nucleic acid fragments and protein-ligand complexes.

Electrophoresis is a fun

Bohuslav Gaš, Faculty of Science, Charles University, Prague, Czech Republic

A Coulombic interaction between all ions maintaining a macroscopic electro-neutrality in the electrolyte solution makes electromigration inherently nonlinear. This is responsible for remarkable phenomena, which are not obvious, say, in chromatography. Here belong electrophoretic systems with moving system zones, resonance phenomena between system and analyte zones (schizophrenic broadening of peaks), unstable electrolyte systems which oscillate when electric current passes, etc. On the other hand, environment in electrophoresis is very simple, which allows to precisely formulate and algorithmize equations describing electromigration. Modern computer can solve the equations numerically and depict the solution in a graphical way. The lecture will give a chance to listeners to anticipate behavior of interesting electrophoretic systems based on their experience or intuition and compare it with the results of numerical simulation.

About the speakers

Dr. Zeineb Aturki got her degree as Doctor in Industrial Chemistry in 1992 at the University "La Sapienza" in Rome. In 1994 she wan a grant and started working for the Institute of Chromatography of the National Council of Research (CNR) and continued working as such until 2001 when she became part of the permanent staff as a researcher of the Institute of Chemical Methodologies (CNR). She has been working with Dr Fanali specializing in the development of new electro-migration and chromatographic methods (CEC, nano-LC, CE-MS, LC-MS) for the separation of chiral and achiral compounds in pharmaceutical, forensic and food applications. She was responsible in helping PhD students in the preparation of their thesis. Since 2004 she has been responsible of a joint project with Czech Republic (CNR-AVCR project) entitled "Application of microseparations and mass spectro-metry to bioanalysis" .

Prof. Bohuslav Gaš is professor of physical chemistry and leader of the group of electromigration separation processes at the Faculty of Science, Charles University, Prague. His present research interests include theory of transport processes in solutions and methodology and instrumentation in capillary and chip electrophoresis.

Prof. András Guttman is holding a Marie Curie Chair Professorship of the European Commission and leads the recently formed Horváth Laboratory of Bioseparation Sciences (HLBS) at the University of Innsbruck in Austria. His main research interests are to pursue basic research in the field of bioseparation sciences with the aim to develop and implement high performance bioanalytical techniques for genomics, proteomics and glycomics based biomarker discovery. Dr. Guttman held prior appointments at Diversa Corporation (San Diego, CA) implementing bioindustrial scale carbohydrate analysis methods; at the Torrey Mesa Research Institute (La Jolla, CA) applying microfluidics methods to large scale genotyping; Genetic BioSystems (San Diego, CA), working on novel microgel electrophoresis platforms; and at Beckman Coulter (Fullerton, CA) developing capillary electrophoresis kits. In his postdoctoral work at the Barnett Institute (Boston, MA), he conducted basic research in the field of capillary gel electrophoresis. He has more than 180 scientific publications, edited several textbooks and holds 15 patents. He is an associate director of CASSS and on the editorial boards of numerous international scientific journals. Dr. Guttman graduated from the Veszprem University (Hungary) in chemical engineering, where he also received his Ph.D. He was awarded the Analytical Chemistry Award of the Hungarian Chemical Society in 2000 and became a member of the Hungarian Academy of Sciences in 2004.

Dr. Dirk Janasek received his diploma degree in biochemistry at the Martin Luther University Halle-Wittenberg in 1994 and PhD degree at the Martin Luther University Halle-Wittenberg in 1999 (PhD thesis about chemilumino-metric enzyme sensor systems). In 2002 received Leopoldina scholarship to join the Manz group at Imperial College London and since 2003 is responsible for miniaturized separation techniques within the Miniaturization Department of ISAS

Prof. Ernst Kenndler - PhD study of Chemistry and Physics, thesis on nuclear chemistry, professor for Analytical Chemistry at the University of Vienna,

Docent at the University of Helsinki, over 15 years lecturer at the Academy of Fine Arts in Vienna, visiting professor at the Universities of Prague, Helsinki, Bologna, Sao Paolo, Buenos Aires, Mexico City. Author of about 200 publications, member of the advisory board of Electrophoresis, Analytical Chemistry, Journal of Separation Sciences, Current Analytical Chemistry, Journal of Capillary Electrophoresis.

Prof. M. Lämmerhofer - Studies of Pharmaceutical Sciences, Graz, Austria. PhD, Department of Pharmaceutical Chemistry, Graz (Prof. Wolfgang Lindner).
Since 1997 at the University of Vienna, Department of Analytical and Food Chemistry (first Assistant Prof., since 2002 Associate Prof.)
1999/2000 - Post-doc, University of California, Berkeley (Prof. J.M.J. Fréchet and F. Svec)
Research interests: Development of functionalized separation materials, chiral recognition in separation science, Capillary separation methodologies, Bioanalytical and pharmaceutical studies (drug, metabolite, pharmaceuticals analysis).

Dr. Mirek Macka obtained his RNDr (equivalent to BSc and MSc) from the Masaryk University in Brno in 1981. He was working as a research scientist in research headquarters of Lachema A.S. Brno, Czech Republic, and later Lonza A.G., Switzerland, responsible for developments of new analytical methods. In 1997 he finished his PhD at the University of Tasmania in the group Prof. Haddad and continued as a postdoctoral fellow working in the area of separations of inorganic and low-MW organic ions by capillary electrophoresis, electrochromatography and ion chromatography. From 2000 till 2005 he was awarded a prestigious Australian mid-career fellowship Australian Research Council Research Fellowship, working in the area of electroseparation methods, including investigating buffer systems and optical and electrochemical detection systems. After an appointment as a Senior Research Fellow, he was awarded a prestigious European Union professorial level fellowship Marie Curie Excellence Grants, which brought him to Dublin City University from April 2006. This FP6 grant and fellowship aims at bringing back originally European Scientists and charging them with building scientific group with a significant potential. The area he chose is "Hybrid microfluidic devices for complex chemical analysis", working in the broader areas of separation science and miniaturized chemical analysis. Mirek Macka has been consistently placed among the 3 most productive Australian analytical chemists in the past 5 years and has published over 100 refereed journal papers with average impact factor over 3.1 and citation number over 12.

Dr. Marek Minárik has finished undergraduate studies in physical chemistry in 1994 in Bob Gas's group of electromigration processes at the Charles University in Prague. After completing 1 year of research work with Ernst Kenndler at the Institute of Analytical Chemistry in Vienna, he moved to the USA to get his Ph.D. in bioanalytical chemistry working in Barry Karger's group at the Barnett Institute, Northeastern University in Boston. His primary focus was on development of instrumentation and applications for CE-based separations of DNA and proteins with main interest in micropreparative fraction collection. After receiving his Ph.D. in 2000 he assumed position in R&D application development at Molecular Dynamics (later acquired by Amersham Pharmacia and GE Healthcare) in Sunnyvale California. In

2002, he returned to Prague to start his own biotech company Genomac International. Today, Genomac is the largest private genomic research center as well as provider of genetic testing in the Czech Republic with 13 employees, 4 doctoral and 2 diploma students. Dr. Minarik is author of more than 25 scientific papers, 2 issued US patents and numerous patent applications.

Dr. Robert Mistrík received a master degree from the Slovak Technical University, Bratislava, Slovakia in 1991 and Ph.D. from the University of Vienna, Vienna, Austria in 1994. For the next three years, he held a postdoctoral position at National Institute of Standards and Technology, Gaithersburg, MD, USA. Back in Slovakia in 1998, he founded HighChem, Ltd., a privately owned software company, and since then he is holding the position of CEO. Dr. Mistrik developed the initial version of Mass Frontier, mass spectra data processing software that has been licensed to more than thousand laboratories and research facilities around the world.

Dr. Pavel Neužil received his M.S and Ph.D. degrees from the Faculty of Electrical Engineering at the Czech Technical University in Prague. Since then, he has worked in different areas of electrical engineering such as CMOS design and manufacturing, as well as the multidisciplinary field of chemical and physical sensors. Currently, he is involved in a development of a portable system for detection of DNA (RNA) of various deceases or pathogens such as avian influenza virus, dengue fewer, SARS and anthrax.

Prof. Emil Paleček, Professor of Molecular Biology of the Masaryk University, Brno.
Education and Training: CSc (PhD, biochemistry) - 1959
Career: 1956- Institute of Biophysics, Czechoslovak Academy of Sciences
1962-63 Postdoc, (with prof. J. Marmur) Brandeis Univ., Waltham, Mass., USA
1989 Corresponding Member of the Czechoslovak Academy of Sciences
1993-97 Member of the Council of the Academy of Sciences of the Czech Republic
2001-05 Member of the Scientific Board of the Acad. Sci., CR
2004- Member of the Board of The Learned Society of the Czech Republic
Field of Scholarly Interest: Physical biochemistry, biophysical chemistry; DNA structure in solution, at interfaces and in cells; Relations between DNA structure and function, DNA supercoiling; DNA-protein interactions; Chemical reactivity of nucleic acids; Electrochemistry of biomacromolecules. Publications: over 290 full papers. Scientific citations of EP papers: In 2002-2004 his papers were quoted >1200x (according to WOS, autocitations excluded). His H index is 44 or more (According to journal "Vesmir", the second highest among scientists working in CR).

Prof. Marja-Liisa Riekkola received her PhD in Analytical Chemistry in 1983 at the University of Helsinki. In 1987 Riekkola was appointed Full Professor in Analytical Chemistry at the University of Helsinki. She has visited several laboratories abroad as a Visiting Scientist/Professor: the Kantonales Labor in Zürich, Switzerland with Dr. Konrad Grob, the University of Colorado, Boulder, CO, USA with prof. Robert Sievers, and Toyohashi University of Technology, Japan with Prof. Kiyokatsu Jinno. Professor Riekkola's research interests related to analytical instrumental techniques include: capillary electromigration techniques, field flow fractionation, miniaturization, multidimensional chro-matography, and on-line coupled

techniques, and related to different research topics: lipoprotein particles, aerosol particles, and utilization of pressurized hot water in chemistry (extraction, chromatography, reactions). Professor Riekkola is an active board member in different both national and international scientific committees, councils, evaluation panels and societies. She has published over 250 scientific refereed publications, one book and seven book chapters, and over 100 other papers in the field of analytical chemistry. Her research has been recognized by the Emmanuel Merck Prize in Chromatography, the Russian Tswett Medal in Chromatography, and she has been appointed a Member of the Finnish Society of Science and Letters. Professor Riekkola has gained a lot of experience in journal editing as a guest editor and as board member of several well recognized peer reviewed journals in analytical chemistry (Chromatographia, Electrophoresis, J. Biochem. Biophys. Methods, J. Chromatogr. Sci., J. Anal. Bioanal. Chem., J. Sep. Sci., and the Analyst). Since January 1, 2005 she has belonged to the team of Editors of J. Chromatogr. A.

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