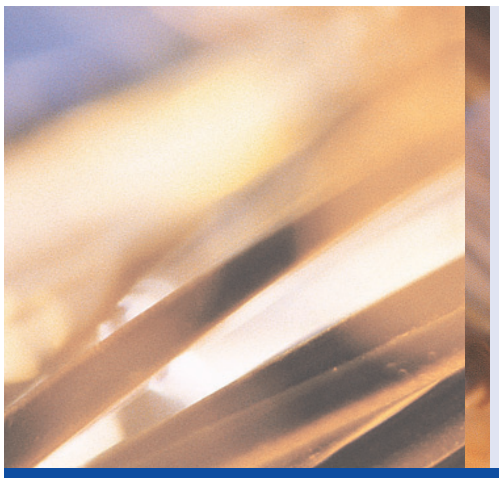


Chromatography Focus

29TH INTERNATIONAL SYMPOSIUM ON CAPILLARY CHROMATOGRAPHY (ICC)

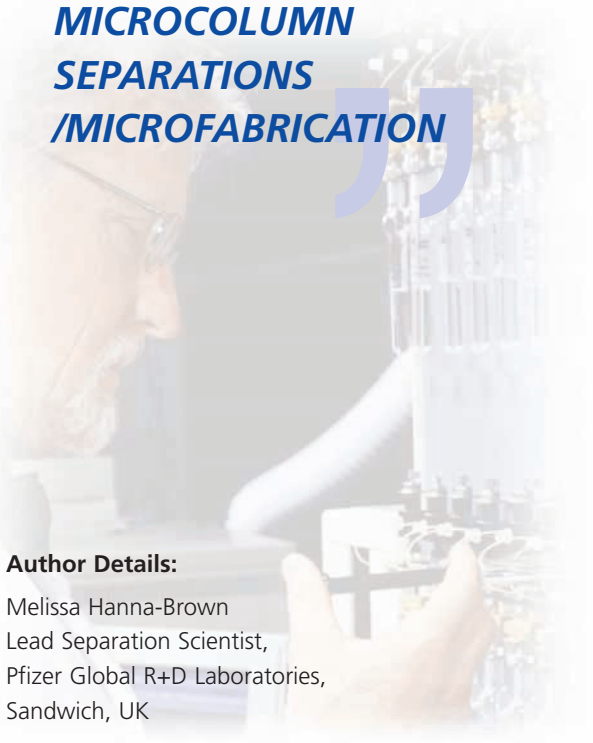
Melissa Hanna-Brown, Pfizer Global R+D Laboratories

The 29th International Symposium on Capillary Chromatography (2006) was held in the Palazzo dei Congressi in Riva Del Garda, Italy, which provided a stunning backdrop (see the scenes from outside the congress venue on right) to a stimulating programme.

The well-organised scientific content of the symposia which was under-pinned by well attended and friendly social events ranging from evening cocktail gatherings to classical recitals and of course the infamous Riva disco evening!

The following outlines some of the highlights from each scientific session in the conference along with some general comments on emerging trends and conference logistics.

> ***A DEFINITE TREND EMERGING IN THIS SYMPOSIA WAS MINIATURISATION AND MICROCOLUMN SEPARATIONS /MICROFABRICATION***



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GENERAL OVERVIEW OF THE SCIENTIFIC CONTENT

The conference opened with the M.J.E. Golay award presentation to Prof. Ed Yeung (Iowa, USA), and subsequent award lecture entitled 'Separation and Detection of Proteins in Miniaturized 2D Gels'. Here, the coupling of miniaturised electrophoresis with native fluorescence detection for fast (<10 mins) and direct analysis of proteins was described with LOD's as low as 15fg (for 532 emission) being achievable via a laser side-entry excitation arrangement. This lecture was followed by the opening plenary lecture of the symposia which was delivered by Prof. Shigeru Terabe (Hyogo, Japan). In this lecture, a review of Prof. Terabes research with MEKC was presented starting from its conception in 1982 and subsequent development of numerous applications through the employment of cyclodextrin additives in MEKC to the later introduction of sweeping (a technique to concentrate/focus neutral analytes). The remaining two sessions of the day focused on 'Microcolumn Separations' and incorporated some interesting lectures including that by Prof. Paul Haddad (Tasmania, Australia) who spoke on 'New Developments in Capillary Separations of Inorganic Ions'. In this lecture, a general overview of capillary separations for inorganic ions was given with particular emphasis on high efficiency monolithic ion-exchange phases, miniaturised conductivity detectors and ion-suppressors. Furthermore, the employment of *in silico* strategies to provide for facile and rapid method development of gradient elution based ion separations was also discussed. One particularly interesting part of this presentation was the discussion about polymer based monoliths upon which surfactants could be coated or, alternatively, anionic monolithic templates constructed to which fully functionalised latex nanoparticles could be coated. Other notable presentations in these sessions included those by Prof. Jim. Jorgenson (North Carolina, USA) who spoke on 'The Use of Micron and Sub-micron Particles in Ultra-High Pressure Liquid Chromatography' and Prof. Milos. Novotny (Indiana, USA) about Quantitative Glycomic Measurements in Health and Disease through Permethylation/LC-MS/MS.

The second day began with parallel sessions on 'Capillary GC' (in memoriam of Prof. Richard Sacks) and 'Microfabricated Devices'. In the former session, of particular interest was a talk by Prof. Milton Lee (Utah, USA) on a 'Hand-Portable SPME-GC-ITMS System for Field Application.

Here, a miniature toroidal RF ion trap MS was described which could be operated at RF voltages significantly lower than those in conventional systems whilst generating high sensitivity. Meanwhile, a 0.10 mm i.d. capillary column provided for rapid analysis and low power consumption with a helium mobile phase

supplied by a small pressurised gas cartridge. Finally, SPME sample introduction was employed via a syringe with identification chip. In the corresponding parallel session, Prof. Michael Ramsey (North Carolina, USA) spoke about microchip liquid chromatography with integrated pumps.

This was a particularly refreshing presentation as it focused on the problematic issues facing the miniaturisation 'supporters' in the separation science community, which include detection sensitivity and loading capacity. Here Prof. Ramsey focused on the employment of electrokinetic pumps for HPLC separations using monolithic or spherical supports to increase sample loadability.

One important issue to overcome with such systems is of course that the same surface providing for the separation (via mainly partitioning mechanisms) must also provide for an EOF. As such, Prof. Ramsey explained how his laboratory had developed a miniaturised system wherein the electroosmotic pump was spatially distinct from the separation channel portion. In such a way, the requirement for external pressure was circumvented and applications using both isocratic and gradient elution were described using this system.

In the afternoon of the second day, parallel sessions ran on 'Sample Preparation' and microcolumn separations. In the former session a notable presentation was delivered by Prof. Johan Roeraade (Stockholm, Sweden) who succinctly described (via video clips) investigations into various liner designs in GC injection systems, and showed how non-homogenous and partially delayed sample vaporisation occurred, before going on to describe how this problem may possibly be circumvented.

In the 'Microcolumn Separations'parallel session, Prof. Marija-Liisa Riekkola explained how capillary and microchip electrochromatography could be employed as versatile techniques for human lipoprotein studies and this was followed by Prof. Corneilius Ivory (Washington, USA) who presented on 'Simultaneous

Two-Dimensional Electrofocusing' and Prof. Morteza Khaledi (North Carolina, USA) speaking on 'Classification of Chemical Selectivity in MEKC and RP-HPLC by the Unified Selectivity Triangle'.

Day three opened (after the Riva disco evening – but despite this, surprisingly fairly well attended) with parallel sessions on 'Comprehensive Techniques' and a continuation of the 'Microcolumn Separations' theme from Day 2 . Prof. Peter Schoenmakers opened the former session with his talk entitled 'Chromametrics: Moving Mountains of Data'. Here, the issues associated with trying to make sense of comprehensive data derived from e.g. GC-GC or LC-LC in target-compounds, group-type or fingerprinting analyses was described. In the current 'omics' focused arena, this talk was particularly timely as Prof. Schoenmakers described some of his groups developments with regards to facilitating such complex data analysis problems. The theme of complex separations and more particularly, metabolomics was also the focus of the speaker (Prof. Fred Regnier (Indiana, USA)) opening the parallel session that same morning on 'Simultaneous Analysis of Multiple Samples in Metabolomics Studies'. Here, the concept of specific tagging of primary amine containing analytes and fatty acids with isotopomers of derivatizing agents for simultaneous analysis via either GC/MS or LC/MS was discussed. Example applications of these techniques as applied to samples obtained from mammalian and plant extracts were also shown.

During the afternoon of day three, delegates had the choice between two topics running in parallel entitled 'GC Detection' and a final 'Microcolumn Separations' session. In the former session, an interesting presentation on 'Innovations in Gas Chromatography – Differential Mobility Detection and Low Thermal Mass Chromatography' was delivered by Dr. Jim Luong (Alberta, Canada). In the other session, a well attended lecture was given by Dr. Gert Desmet (Brussel, Belgium) on 'Relation between the Chromatographic Performance and the Flow Paths in Monolithic Columns.' In this lecture, Dr Desmet described how the volumetric through-pore fraction of packed bed columns was a parameter with significant potential to aid in the design of improved monolithic supports (in terms of both speed and resolution). His discussion focused on the demonstration of computational fluid dynamic simulations to identify the problems impeding the generation of highly efficient monolithic columns.

On the final day, a short morning programme included parallel sessions on 'Miscellaneous Applications' and a second session on 'GC detection (Column Technology)'. In the former session, two particularly interesting lectures were delivered by Prof. Pavel Jandera (Pardubice, Czech Republic) on 'Programmed Elution Techniques in Conventional and Micro-HPLC' and Prof. Salvatore Fanali on 'Recent Advances in Electrodriven Methods Applied to Food Analysis'. In the corresponding parallel session, Prof. Heinz Eckhardt (Freiberg, Germany) presented a lecture on 'Towards as Fiber-Optic Detection Device for GC-UV' while Dr. Abdul Malik (Florida, USA) talked about 'Sol-Gel Organic-Inorganic Hybrid Stationary Phases and Micro-Exctraction Media Based on Silica, Titania, Zirconia and Beyond.

EMERGING TRENDS

A definite trend emerging in this symposia was miniaturisation and microcolumn separations /microfabrication (especially given that out of 12 sessions 7 were dedicated to these topics). Of course given the recent advances in sub-2µm column particles and associated instrumentation technology, discussion around this area was also a recurring theme.

Another topic which was not forgotten was GC, and as this conference has a firm reputation established around this technique it was good to see that advances continued to be discussed here (with sessions dedicated to capillary GC , GC detection and GC column technology).

Finally, a theme which seems to be gaining momentum and for which two sessions (in addition to a discussion session) were dedicated, was comprehensive techniques (and the associated chemometrics these sorts of methods necessitate). This is certainly one area which is seeing some intense research focus for diverse applications areas (and not just proteomics/metabolomics) and debate after these lectures was particularly interesting in this respect.

GENERAL COMMENTS REGARDING THE CONFERENCE LOGISTICS

ICC 2006 was set in a location small enough to ensure good attendance at the social events whilst interesting enough to provide accompanying persons with a varied programme. The scientific level of the conference was generally excellent and presentations were generally clearly formatted and audible. At the end of each Tuesday and Wednesday, a number of 15 minute key-note lectures were programmed which allowed for a wide variety of topics to be discussed.

Many of these key-note lectures were supported by posters (of which were in the region of 400). Furthermore, the inclusion of manufacturer seminars (which were well attended) allowed for a comprehensive overview of the scientific trends outlined above. Finally, it is fair to say that this meeting had a relaxed atmosphere and the location provided a suitably pleasant environment for many friends in the Separation Science community to meet. The informal atmosphere notwithstanding, was flexible enough for sufficiently high quality and leading edge scientific papers to be discussed and critiqued. In conclusion – an enjoyable well organised and informative conference.

AUTHOR BIOGRAPHY

Dr. Melissa Hanna-Brown has been appointed (April 2006) as Lead Separation Scientist for Pfizer Global R+D Laboratories in Sandwich (Kent, UK). Prior to this, she held a Lectureship in Separation Science within the Department of Pharmacy at King's College London. Her previous research activities included (amongst other areas) development of multi-column electrophoretic instrumentation and integrated separation and chemometric strategies for metabolomics.

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New Guard for Better Performance, Longer Prep Column Life

Isolation Technologies announces the release of Iso-Prep Guard, a guard cartridge system designed to protect valuable prep columns. Iso-Prep Guard offers superior column protection for adsorptive samples and a proven sample distribution mechanism via a precision machined holder. Its short 10mm length yields low pressure drop at flow rates in excess of 50ml/min. It is ideal for protecting prep columns from 20-50mm inner diameter with no degradation of peak shape or plate count.

"Iso-Prep Guard protects columns in two ways," says Geoff Todosiev, Vice President of Business Development for Isolation Technologies. "First, it acts as a filter, trapping particles in their frits. Second, when the guard column is packed with the same material as the prep column, it removes compounds that irreversibly adsorb to the packing material." A simple packing technique adds to the time-saving effectiveness of Iso-Prep Guard Cartridge. The 10 x 21.2mm (length x diameter) Iso-Prep Guard Cartridge system is now available from Isolation Technologies.

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