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PITTCON'92 in New Orleans

The 43rd Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (PITTCON'92) took place in New Orleans, during the week of March 9–13, 1992. Some 30 000 scientists, students, industry representatives, publishers, and exhibitors attended the Conference. The exposition was the largest one ever assembled in a single convention hall, housing some 1 020 vendors and their products in about 3 000 booths.

As before, PITTCON'92 was run on a non-profit, volunteer basis, organized by the Spectroscopy Society of Pittsburgh (SSP) and the Society for Analytical Chemists of Pittsburgh (SACP). In its tradition to promote scientific education, PITTCON'92 provided a number of grants to high schools and more than a half-million dollars were assigned for educational programs during the forthcoming year. March 9–13, 1992, was proclaimed Science Week in New Orleans, Louisiana, and the Mayor of the City of New Orleans, *Sidney J. Barthelemy*, officially declared Wednesday, March 11 and Thursday, March 12, 1992, as Science Education Days in New Orleans. Numerous teachers with hundreds of students were invited to visit the exposition on these days.

For the first time, PITTCON'92 selected to participate in the US Department of Commerce Foreign Buyers program. This international trade development program attracted many interested foreign delegations to both the conference and exposition.

The technical sessions, including seminars, lectures, and posters as well as educational and award-giving events, and the exposition with workshops and product demonstrations were held in the New Orleans Convention Center on the riverside of the Mississippi.

The poster sessions were substantially enlarged over those presented in previous years, including some 531 articles. Poster sessions were presented on Chromatography, Electrophoresis, Mass Spectrometry (MS), Infrared Spectroscopy (IR), Nuclear Magnetic Resonance Spectroscopy (NMR), X-Ray Diffraction (XRD) and Inductively Coupled Plasma Spectroscopy (ICP), Atomic Absorption, Microscopy, Laser Techniques, Instrumentation, Software Developments, Clinical Chromatography, and Environmental Topics.

The Award Program

Eight outstanding scientists were honored for their achievements in different award programs of the conference symposia.

J. Calving Giddings, Professor of Chemistry at the University of Utah in Salt Lake City, received the *Pittsburgh Analytical Chemistry Award*, sponsored by SACP. A major area of Dr. *Giddings*' research has been chromatography in almost all of its fundamental aspects. He has worked on the unification of separation theory, new separation methodology, macromolecular separations, techniques for diffusion coefficient measurements, theory of diffusion, chemical kinetics, and snow and avalanche physics. He has invented and extensively developed the versatile field-flow fractionation method for macromolecular separations, and has been active in research and education dealing with environmental problems. He is author of more than 340 publications and editor of 31 books, among them *Dynamics of Chromatography* (1965), *Chemistry, Man, and Environmental Change* (1973), and *Unified Separation Science* (1991). He has been an executive editor of *Separation Science and Technology* since 1966 and is executive editor in the book series *Advances in Chromatography* (31 volumes). *Giddings* received numerous awards, among them the *ACS Award in Chromatograpgy* (1967), the *Stephen Dal Nogare Chromatography Award* (1979), the *ACS Award in Analytical Chemistry* (1980), and *the Russian Scientific Council Chromatography Award* (1980). He is a honorary doctor from the University of Uppsala (1987). In 1975 Dr. *Giddings* organized an expedition that was the first to successfully explore and descend the upper canyons of the Apurimac river in Peru, which is the source of the Amazon River.

Heinz R. Engelhardt, Professor of Chemistry at the Unversity of Saarland at Saarbrücken, received the *Dal Nogare Award*, given by the Chromatography Forum of the Delaware Valley. Dr. *Engelhardt* has been involved in the organization of many international symposia on chromatography since 1982. In 1989 he served as Acting Chairman of the German Chromatography Discussion Group and was a member of the Board of the Subdivision of Analytical Chemistry. He has published more than 140 papers in areas related to separation science such as thin layer and classical column chromatography, supercritical fluid chromatography (SFC), supercritical fluid extraction (SFE), and capillary electrophoresis (CE). He also published two books *Einführung in die HPLC* (1975) and *Introduction to HPLC* (1979). He served as editor of *Practice of HPLC* (1985) and on the advisory editorial board of *Chromatographia* (since 1980) and the *Journal of Chromatography* (since 1988).

Dr. *Stephen W. Feldberg* a senior chemist in the Department of Applied Science at the Brookhaven National Laboratory in Upton, New York, was the recipient of the *Charles N. Reilley* Award sponsored by

the *Reilley* Endowment Fund of the Society for Electroanalytical Chemistry (SEAC). *Feldberg*'s research interests encompass a number of areas of electrochemistry, including the theory of coupling of transport, homogeneous kinetics, computer simulation, ion and electron transport in membranes, photoelectrochemistry, fast interfacial phenomena, and conducting polymers.

Herbert S. Gutowsky is Professor of Chemistry at the University of Illinois at Urbana-Champain, where he began his career in 1948 as an instructor and later became head of the Department of Chemistry and Chemical Engineering (1967–1970), and both Director of the School of Chemical Sciences and head of the Chemistry Department (1971-1984). He received the *Pittsburgh Spectroscopy* Award for his outstanding contributions in the field of NMR. He applied NMR to the study of molecular and solid-state structure and chemical dynamics; he was the first chemist to apply NMR to the structure of solids, he laid the foundation for chemical NMR spectroscopy with studies of ^{1}H, ^{19}F, and ^{31}P spectra. More recently, he has used microwave rotational spectroscopy for the study of small, weakly bonded clusters. Professor *Gutowsky* is author of more than 270 publications and he held numerous offices. Some of his honors and awards include the *Guggenheim* Fellowship (1954–1955), *Irving Langmuir* Award in Chemical Physics (1966), Award of the International Society of Magnetic Resonance (1974), *Peter Debye* Award in Physical Chemistry (1975), National Medal of Science (1977), and the *Wolf* Prize in Chemistry (1984).

Jyrki K. Kauppinen, Professor of Physics and Docent in both Physics and Optical Measurement Technology at the University of Turku, Finland, was awarded with the *Bomem-Michelson* Award, sponsored by the Coblentz Society. His research interests include high resolution *Fourier* Transform Spectroscopy, the development of high resolution interferometers, IR wavenumber standards, conventional rotation-vibration, molecular spectroscopy, low resolution stationary interferometers, the development of commercial FTIR spectrometers and the treatment of experimental data by various sophisticated mathematical methods. He has published about 130 papers in international scientific journals, and he is a member of the working group of the International Union of Pure and Applied Chemistry (IUPAC) for Unified Wavenumber Standards. He was named Research Fellow of the National Research Council of Canada in 1980, and was selected Senior Fellow in the Academy of Finland in 1981.

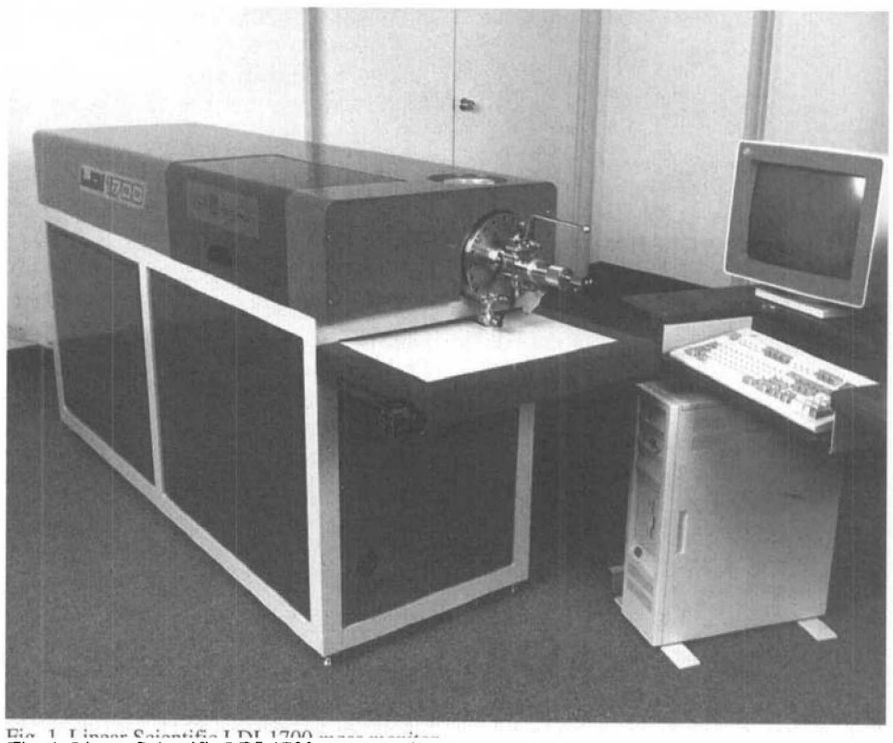

Fig. 1. Linear Scientific LDI-1700 *mass monitor*

Robert E. Siever, Professor at the University of Colorado at Boulder, received the *Keene P. Dimick* Award administered by SACP and sponsored by *Keene P. Dimick*. He was a co-founder of *Sievers Instruments Inc.*, a company manufacturing innovative detectors for chemical analysis. He published *ca.* 150 scientific articles dealing with chromatography and various aspects of inorganic, analytical, and environmental chemistry. He previously received the *Tswett* Chromatography Award. In 1980, he was appointed Director of the Cooperative Institute for Research in Environmental Sciences. He has served as chairman of the National Academy of Sciences, was a member of the Committee on Atmospheric Chemistry (1987–1990), was Science Advisor of the US Environmental Protection Agency (EPA), and a member of the Advisory Board for the Office of Health and Environmental Research.

Timothy D. Harris, supervisor of the Solids Characterization Research for AT&T since 1986, received the *Williams-Wright* Industrial Spectroscopist Award, sponsored by the Coblentz Society. Since 1983 Dr. *Harris*' primary research activity has been the development of spectroscopic methods and instrumentation for the identification and quantitation of impurities in direct gap semi-conductors, including, the first donor identification in bulk GaAs, quantitative acceptor concentration measurements in GaAs, and a thorough understanding of the photoluminescence of GaAs on Si and GaAs on InP. His current activities include research toward general methods of quantitative semiconductor photoluminescence, impurity identification in ternary alloys, quantitative *Raman* scattering methods to study interface structure, bonding geometry, and enhancement mechanisms for impurity vibrational modes. Very recently, he has focused on methods for exeeding diffraction limits to spatial resolution for optical spectroscopy and microscopy.

Dr. *William R. Windham*, a researcher who conducts near IR reflectance (NIR) calibration for nutritive value constituents of agricultural feedstuff, received the *Tomas Hirschfeld* Award, sponsored by *Bran & Luebbe Analyzing Technologies*. He worked as a research animal nutritionist in the Plant Structure and Composition Research Unit of the *Richard B. Russell* Research Center of the US Department of Agriculture and is currently on a one-year sabbatical leave at the Department of Agriculture Pastoral Research Institute, Hamilton, Victoria, Australia, where he is conducting NIR research as applied to Victorian agriculture.

The Conference

The technical program consisted of 42 symposia and 122 lecture sessions, 1 335 oral presentations and 531 posters.

The chromatography contributions were focused on chromatography fundamentals and instrumentation; optimization, characterization and recent advances

in gas chromatography (GC), headspace/purge and trap analysis, environmental applications, chiral separations by high performance liquid chromatography (HPLC or LC), separation of proteins and other biogenic compounds, carbohydrate analysis, clinical and pharmaceutical applications, mobile phases and detectors in LC, data analysis and method evaluation, pre- and post-column derivatizations, microcolumn technology and LC coupled with electrospray and particle beam mass spectrometry. Supercritical fluid chromatography (SFC), countercurrent chromatography (CCC), and size exclusion chromatography (SEC) for polymer analysis were other topics in this field.

Other separation techniques discussed included capillary electrophoresis (6 symposia or lecture sessions), field-flow fractionation, and supercritical fluid extraction (SFE).

Numerous contributions were presented in recent advances of mass spectrometry (MS), particularly stressing inductively coupled plasma MS, time-of-flight-MS (TOF-MS), laser desorption/ionization MS (LDI-MS), quadrupole ion traps, and *Fourier* transform MS (FT-MS).

A surprisingly large number of contributions covered the field of electrochemistry with topics on advances in methodology, kinetics and mechanisms, conducting polymers, electrochemical sensors and detectors, surfaces and solutions, and bioelectrochemistry.

In optical spectroscopy the most popular contributions were in the fields of *Raman*, IR, and UV/VIS techniques; X-ray methods; atomic absorption, atomic emission, chemiluminescence and nuclear magnetic resonance spectroscopy; scanning probe microscopy, laser applications and fiber otical sensors.

An increasing interest was devoted to sample handling techniques, automation, chemometrics, real-time process analysis, bioanalysis, polymer and materials characterization, environmental issues, thermoanalytical techniques, computer developments and laboratory management systems (LIMS), and the status of analytical chemistry in the world.

Single symposia or sessions were devoted to flow injection analysis (FIA), applied surface analysis, the analysis of nucleotides, carbohydrates, food, single nerve cells, and coal, oil, and lubricants; trace determinations in metals, ores and concentrates; EPA methods, chemical property prediction techniques, new forms of carbon, the *Hubble* space telescope, women and minorities in the chemical sciences, unique medical challenges in the desert storm war, archeometry, pesticides residue methodlogy in foods, analytical and clinical toxicology, and industrial hygiene.

For the third time the *James L. Waters* Annual Symposium was held, recognizing pioneers in the development of analytical instrumentation. It was devoted to IR spectroscopy, honoring *Paul L. Wilks* from *Perkin-Elmer*, *Bryce L. Crawford*, Professor emeritus from the University of Minnesota, *Foil A. Miller*, Professor emeritus from the University of Pittsburgh, *Norman Sheppard*, Professor of Chemistry at the University of East Anglia in Norwich, England, and *Peter R. Griffiths*, Professor and Chairman of Chemistry at the University of Idaho in Moscow.

The plenary lecture was given by Dr. *Carl Djerassi*, Professor of Chemistry at Stanford University since 1959. His contribution was entitled *Science in Fiction is Not Science Fiction – Is It Autobiography*?

For the first time PITTCON'92 introduced *The PITTCON'92 Environmental Institute*, a forum to address environmental issues facing the modern analytical laboratory. Three sessions were held during which experts in the field made presentations on important environmental topics, such as *Data Integrity in the Environmental Laboratory Community*, including a discussion of *Good Automated Laboratory Practice Guidance*; *Risk Communication/The Public Demands to Know: How Chemists Can Answer*, and *The Impact of Environmental Regulations on the Analytical Laboratory*. These events were completed with a Round Table Discussion on Friday, March 13, 1992.

The trends exhibited by the great multitude of oral presentations may be summarized as follows: Analytical chemistry is expanding with a fast growth into the biological sciences, creating a new discipline, analytical biology, with the subdisciplines analytical biotechnology and analytical molecular biology. Large numbers of samples due to analytical investigations are collected in modern organic synthetic and in biology laboratories as well as in biotechnical production, where down-stream cleaning is of utmost importance. All these activities require instantaneous monitoring of analytical parameters, and, therefore, are in need of fast, simple, and novel analytical techniques. Analytical techniques are increasingly applied to real-time process analysis, bringing the analytical laboratory to the production floor. The instrumental ease of handling allows to increasingly apply analytical techniques outside of the specialist's analytical laboratory. LC/MS techniques have become routine, favoring electrospray MS. Laser desorption/ionization time-of-flight MS (LDI/TOF-MS) is a forthcoming technology with many valuable applications in the field of high-molecular weight polymers, especially the biopolymers. High-molecular mass compounds offer the most challenging opportunities in the future development of analytical instrumentation. Analytical investigations are more and more shifting from the conventional separation technologies, such as chromatography, to high-resolution and fast techniques such as CE and LDI/TOF-MS, respectively. Optical and electrochemical principles form the foundation for the development of chemo- and biosensors. Progress is made in the practical use of such sensors.

The Exhibition

For the first time exhibitors were allowed to sell equipment and instrumentation on the floor of the trade show. This change in policy was made possible by the Internal Revenue Service, which banned the sales in previous years. The New Orleans Convention Center in its present dimension was opened early this year. The new hall permitted that the exposition and meeting areas were all under the same roof. The different booths were arranged in a generous layout allowing the visitors to leisurely join the individual booths and to rest in a number of sitting areas to study the many handouts given by the exhibitors.

A new chapter in analytical instrumentation was written at PITTCON'92. The introduction of a number of commercial *LDI/TOF-MS* systems attracted the attention of a majority of the chromatographers, mass spectroscopists, chemists and biologists active in the field of biopolymers. During the last few years LDI/TOF-MS has been developed by a handful of scientists in Europe and the USA. Pioneers in the field were *Franz Hillenkamp* and *Michael Karas* from the University of Münster in Germany, who discovered the technology in the late 1980's. The technique was significantly improved by *Brian T. Chait* and *R. C. Beavis* at Rockefeller University in New York, and *Robert J. Cotter* at John Hopkins University in Baltimore. *K. Olaf Börnsen*, *Martin Schär* and *Ernst Gassmann* (*Ciba-Geigy AG, Basel*) also developed a system for internal use.

LDI/TOF-MS takes advantage of a matrix-assisted desorption of analyte molecules embedded in a solid matrix formed by a special kind of compounds, such as nicotinic acid, sinapinic acid and dihydroxy benzoic acids. These aromatic acids absorb with high efficiency light provided by a nitrogen laser (337 nm). The irradiat-

ed spot is immediately desorbed and during the process proton transfer reactions to or from the analyte take place, leaving charged (+H or –H) analyte molecules in the gas phase, surrounded by abundant matrix molecules of low molecular mass. LDI/TOF-MS can be run in either the positive or negative ion mode. The mixture of analyte and matrix ions is accelerated in a static electical field (typically 20 kV) over a relatively small distance. This field attributes the same kinetic energy to all the existing ions. Subsequently, the formed and accelerated ions move with a constant speed, dependent only on their mass, through the drift tube, which typically has a length of 100–200 cm. The traveling time is in the order of a few 100 µsec. Detected by a multichannel plate the flight time (t) is measured and the molecular mass (m) is calculated from t. In TOF-MS the flight t of an ion is correlated with its mass m over a simple relationship:

$$(m/z)^{1/2} = At + B$$

where A and B are calibration constants, depending on the strength of the electric field and the length of the drift tube. Using a standard of known mass allows the determination of the constants A and B.

The prominent features of the LDI/TOF-MS technology are: LDI/TOF-MS is a separation technique similar to the chromatographic methods. It is closely related to plasma chromatography developed by *Francis W. Karasek* in the early 1970's. Compared with HPLC, LDI/TOF-MS shows a much higher resolution (it exhibits around 1 Mio plates). The technique enables the identification of the analyte molecules based on molecular mass rather than retention time. It is, therefore, an extremely powerful analytical tool, outperforming HPLC in many cases where it is applicable. LDI/TOF-MS is applicable to compounds in the mass range between 200 and 300'000 daltons. In LDI/TOF-MS the sample preparation is extremely simple and, because the analyte molecules are not fragmented and in most cases singly charged, the instrumental system is easily operated (it requires no MS specialist). As the chromatographic technologies, LDI/TOF-MS is not a structure elucidating technology and fascinates by its speed and ease of handling. In the average a sample, including the sample preparation, requires an analysis time of less than 3–5 min.

Bruker Instruments Inc. in Billerica, Massachusetts, *Finnigan Mat*, a subsidiary of *Thermo Instruments Inc.* in Windsor Locks, Connecticut, *Linear Scientific Inc.* in Reno, Nevada, and *Vestec Corporation* in Houston, Texas, exhibited LDI/TOF-MS systems, ranging in price between 250 000 and 450 000 $. There were significant differences in the performance of the different instruments. The largest number of significant applications covering a wide spectrum of substance classes were demonstrated by the *Linear Scientific LDI-1700* system (*Fig. 1*). Some of the exhibited and during the show undertaken investigations are shown in *Figs. 2–7*.

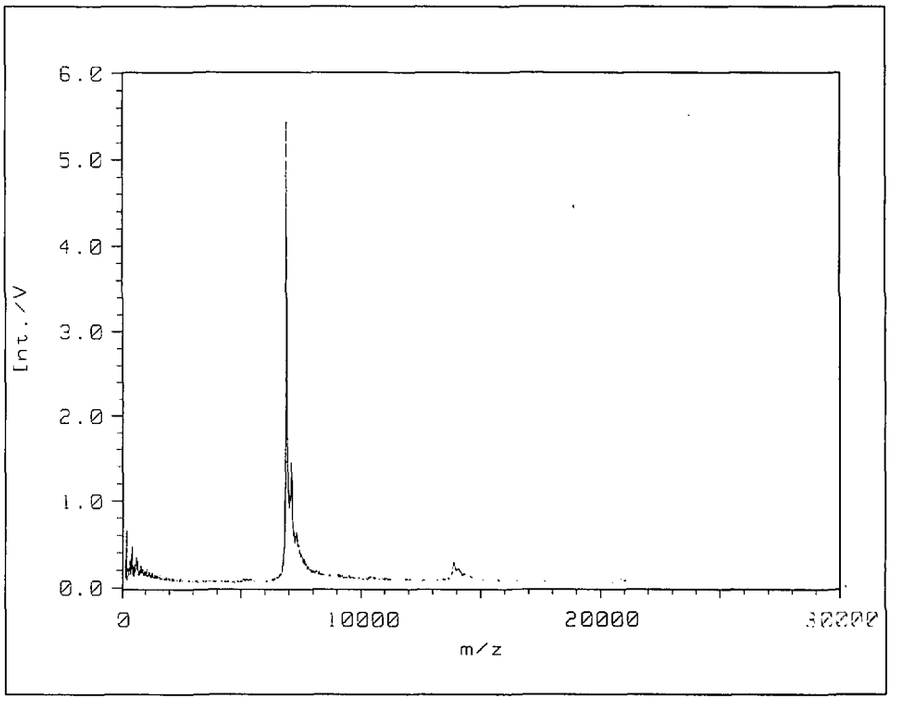

Fig. 2. *Positive-ion MS of 65 amino acid protein r-hirudin* (m.wt. = 6963.5 Da). Matrix: sinapinic acid; instrument: *Linear Scientific LDI-1700.*

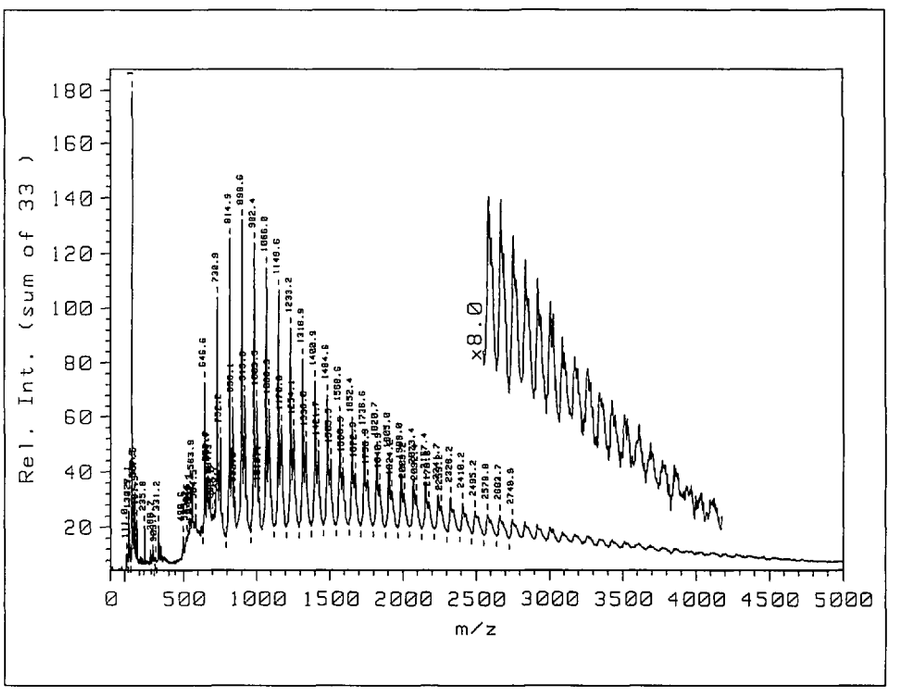

Fig. 3. *Positive-ion MS of a poly (R)-hydroxybutyric acid mixture.* Matrix: sinapinic acid; instrument: *Linear Scientific LDI-1700.*

Sensar Corporation, University Station, Provo, Utah, is a new company founded by Professor *Milton Lee*. It exhibited a uniquely configured TOF-MS with an atmospheric pressure ionization source, featuring a supersonic ion beam perpendicular to the direction of the ion acceleration. The manufacturer claims femtogram detection limits. The system is designed to simultaneously analyze 24 compounds

within 1.2 ms. The suggested applications are real-time vapor detection, process stream monitoring, and detection for chromatography and capillary electrophoresis. The system may be run in either positive or negative ion mode. The detection is realized by a dual microchannel plate. The mass resolution is claimed to be 500 at 450 dalton and the mass range extends from 0 to 5000 dalton.

The *Finnigan MAT INCOS XL* is especially designed for environmental analysis, forensic sciences and analytical laboratories. It may be combined with GC and autosamplers. For LC an interface for thermospray is provided. In addition Direct Exposure Probe (DEP) and Solid Probe are available, equipped with a turbo pump. The mass range of the system covers *m/z* 4 to 1000. It is run with Autoquam soft ware.

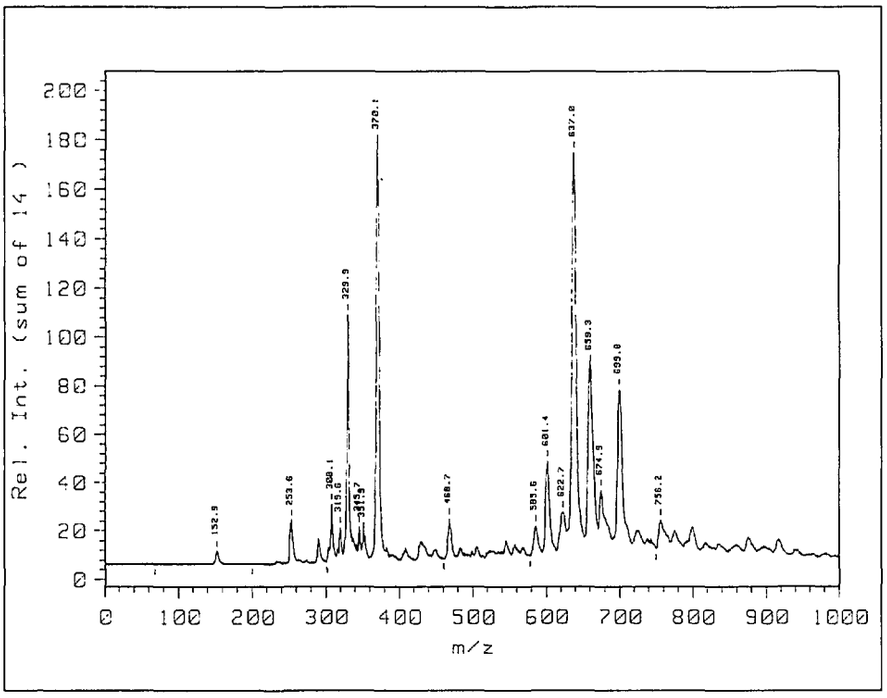

Fig. 4. *Negative-ion MS of a mixture of reactive dyes.* Matrix: 2,5-dihydroxybenzoic acid; instrument: *Linear Scientific LDI-1700.*

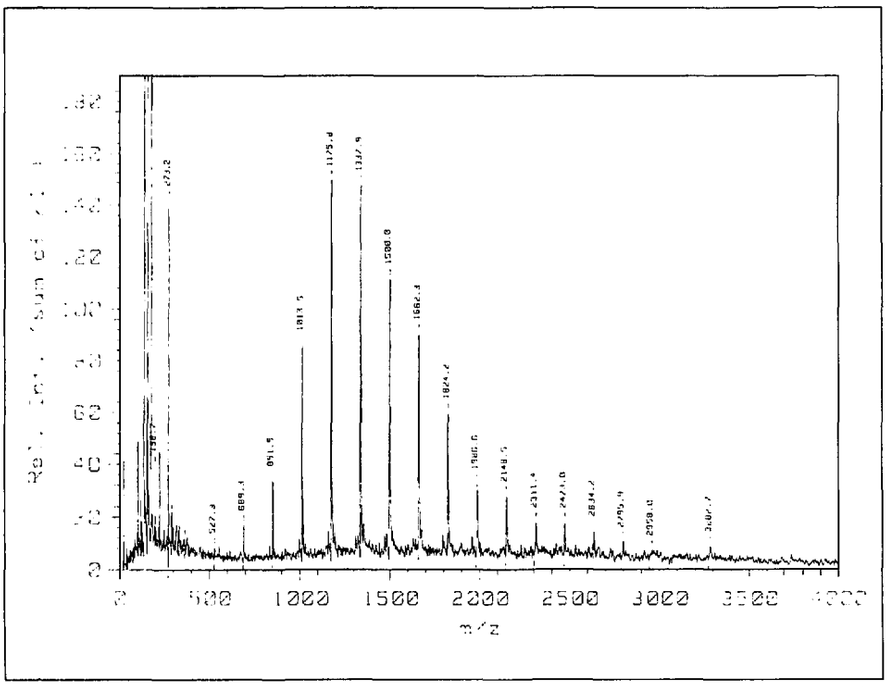

Fig. 5. *Positive-ion MS of an oligosaccharide mixture.* Matrix: 3-amino-4-hydroxybenzoic acid; instrument: *Linear Scientific LDI-1700.*

Analytical Technology Inc., in Chicago (ATI) acquired the Automass benchtop quadrupole MS of *Delsi Nermag Instruments* through *Unicam Ltd.*, ATI's operating subsidiary in Cambridge, England.

Jeol Ltd. in Tokyo, Japan entered a distribution agreement with ATI covering Japan, Taiwan, and Korea, where they sold the product before.

ATI formed a new company, *Unicam Mass Spec*, to manage the Automass business. The production will continue to be in Argenteuil, France.

Millipore Corporation, in Bedford acquired *Extrel Corporation* in Pittsburgh, expanding their business in the field of MS.

Micro-Tech Scientific, Inc. Saratoga, California exhibited a micro-HPLC system based on fused silica micro-bore columns: Prodigix 4 P HPLC system (only 12 inches) with 4 independently controlled pump channels. It can be configured to become a binary, ternary, or quaternary gradient pumping system. The micro-HPLC system allows a flow rate of 500 nl/min to 5 ml/min under isocratic conditions, and 10 ul/min to 5 ml/min under gradient conditions.

Photovac Inc., in Thornhill, claims to have exhibited the world's first commercial hand-held GC. The miniature GC, Snapshot, weighs 3.6 kg and can automatically analyze air and headspace for trace contaminants to levels of 0.1 ppm. The product has a 10-element, stainless steel valve array, 2 miniature capillary columns in a mini-oven and a sensitive photoionization detector (PID). Its production is scheduled for September 1992.

Gilson Company, Inc., Worthington, Ohio, presented the first packed column SFC system, coming up with the features we were waiting for the last 5 years. Unfortunately, the sophisticated system was not promoted in an adequate way, and, therefore, was not able to attract the attention it deserved. No written information was available on the system.

Perkin-Elmer Corporation, Norwalk, Connecticut, enjoyed the largest and one of the most attractive booth area of the show, exhibiting instrumentation in the field of LC, HPLC-MS, GC, GC-FTIR, GC-MS, ICP, ICP-MS, AA, FTIR, FTIR microscopy, UV/VIS and fluorescence spectrometers, thermal and elemental analyzers, biotechnical products, such as PCR/DNA amplification, environmental and air monitoring, pharmaceutical analysis, chromatography and laboratory computing, LIMS systems, and overnight-response supplies, accessories, and software. Most of the novelties (80%) were in the field of software improvements.

In capillary electrophoresis (CE), *Beck-*

man replaced the *P/ACE 2000* system by the *P/ACE 2050* with improved sensitivity. A computer-controlled, flexible autosampler and effective liquid cooling of the capillary cartouche allows the use of high ionic strengths. The *Beckman* LCCE represents a computer-controlled combination of HPLC and CE containing the *P/ACE 2100* CE and Gold System HPLC.

Lauerlabs B.V., exhibiting its products at the booth of *Spark Holland B.V.* is a new company, presenting a CE instrument, with autosampler and different detectors (UV/VIS, fluorescence and MS). The company was founded by *Hank Lauer* and *W. Smink* of *Spark Holland*. Presently the company employs 10 people.

Electrophoresis in preparative scale purification is one of the fastest-growing bioseparation businesses today. The methods used are electrophoresis (mainly preparative PAGE, 39%), HPLC (8%), both techniques (34%), and high-speed centrifugation (19%). In protein purifications, HPLC is the method of choice (66%); in nucleic acids purification, electrophoresis is the method of choice (45%).

Bruker Analytische Messtechnik GmbH in Rheinstetten exhibited a variety of analytical instruments, among them an NMR spectrometer with square-wave characteristics with radio frequency pulse cascade. This method is especially useful for image generation NMR tomography, multidimensional NMR spectroscopy and volume-selective NMR.

Fisons Instruments in Uxbridge, England, owns *ARL*, *Carlo Erba Strumentatzione*, *Haake*, and *J&W Scientific*, and more recently *VG*. Their businesses are viscometry/rheology, AES, WDXRF, GC, HPLC and MS. The company introduced 20 new products, among them an atmospheric pressure chemical ionization HPLC interface. *Fisons* claims to sell the only compact, cost-effective API accessory that can be added to inexpensive GC-MS instruments.

Fisons has now 25 operating companies and marketing is done by *Fisons Instruments Europe* and *Fisons Instruments North America*.

The operating companies are in the Organic Division: *VG Masslab*, *Carlo Erba Instruments*, *VG Data Systems*, *VG Analytical*, *VG BioTech*, and *VG Laboratory Systems*; in the Inorganic Division: *VG Elemental*, *VG Gas Analysis Systems*, *VG Isotech*, *VG Quadrupoles*, *ARL*, and *Kevex*; in the Surface Sciences: *VG Semicon*, *VG Scientific*, *VG Microtech*, *VG Microscopes*, *VG Electronics*, *SSI*, and *Vacuum Generators*; and in the Scientific Equipment Division: *Haake*.

Markets with especially high growing rates are the clinical diagnostics and the environmental monitoring and control businesses.

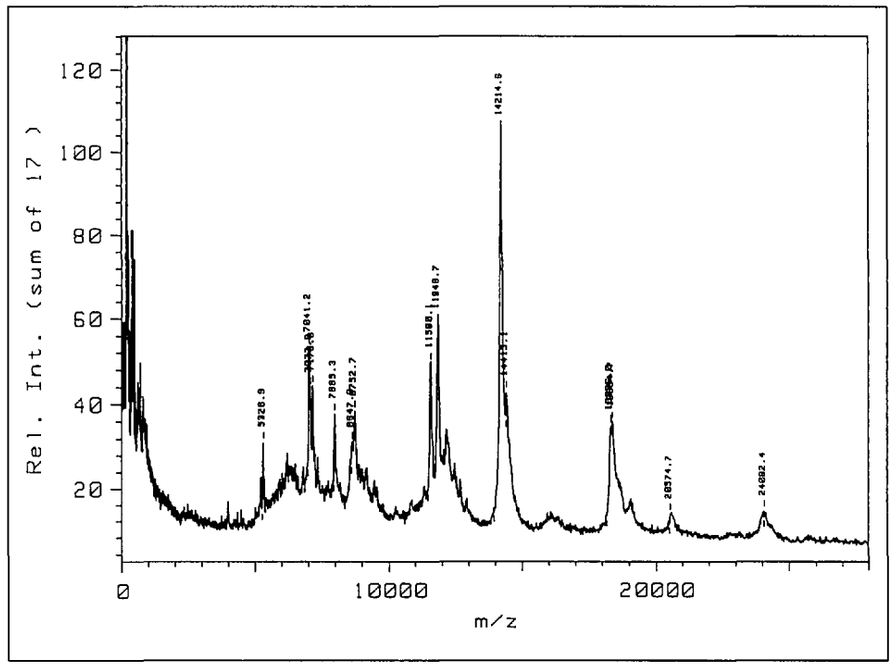

Fig. 6. *Positive-ion MS of bovine milk.* Matrix. Sinapinic acid; instrument: *Linear Scientific LDI-1700.*

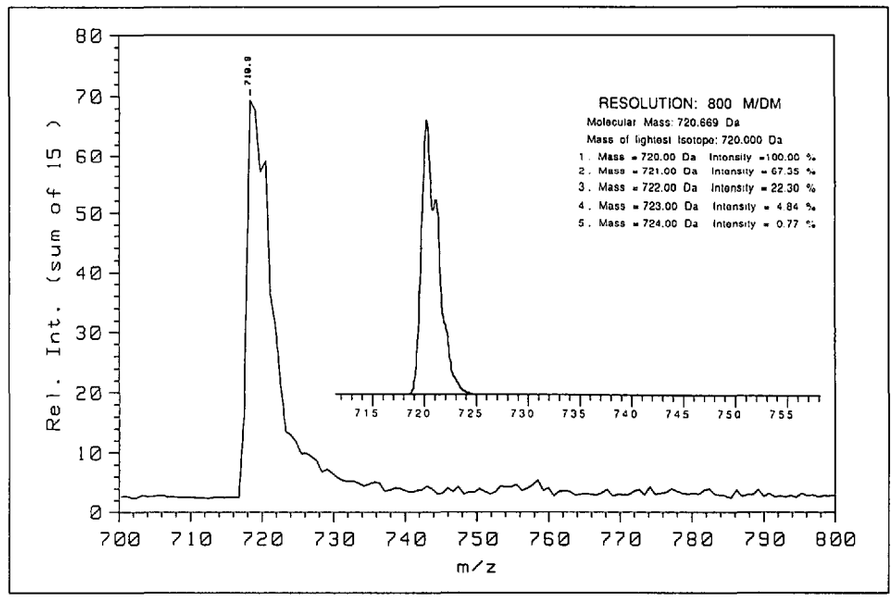

Fig. 7. *Negative-ion MS of buckminsterfullerene (C_{60}).* Matrix: none; instrument: *Linear Scientific LDI-1700.* The small insert represents the theoretical MS with the natural isotope distribution of the pure compound C_{60}.

Applied Biosystems Inc., in Forster City (ABI) acquired a world-wide licence to *Du Pont*'s dye-terminator DNA sequencing patent. This technique cuts the sample preparation effort by a factor of four and gives better sequencing data than single labelled primer methods. Furthermore it sublicenced from *Hoffmann-La Roche* and *Perkin-Elmer* the PCR technology in forensic applications and from *Genmark* to use human genetic markers in DNA fingerprinting. It is interesting to note that the DNA sequencing business is a 60–70 Mio $ a year market.

Topometrix Corportion in Santa Clara, plans to become the world's number one supplier of scanning probe microscopy instrumentation. The Swiss distributer is *Paul Bucher*. European distributers are supported by the central application and technical center in Darmstadt.

Next year's PITTCON will meet in Atlanta on Monday, March 8 and continue through Friday, March 12, 1993. The next shows are planned for Chicago (1994), New Orleans (1995), and Atlanta (1996).