

# The Analyst

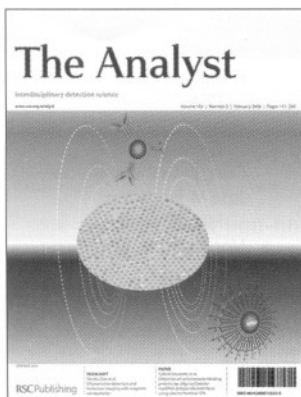
Interdisciplinary detection science

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## IN THIS ISSUE

ISSN 0003-2654 CODEN ANALAO 133(2) 141–280 (2008)



### Cover

See J. Yang, J. Gunn, S. R. Dave, M. Zhang, Y. A. Wang and X. Gao, pp. 154–160. The cover image illustrates a transmission electron micrograph (TEM) of monodisperse magnetic nanoparticles and their widespread biomedical applications, such as biomolecular sensing and detection. Image reproduced by permission of Xiaohui Gao from *Analyst*, 2008, **133**, 154.

## CHEMICAL TECHNOLOGY

T9

Drawing together research highlights and news from all RSC publications, *Chemical Technology* provides a 'snapshot' of the latest applications and technological aspects of research across the chemical sciences, showcasing newsworthy articles and significant scientific advances.

## Chemical Technology

February 2008/Volume 5/issue 2

[www.rsc.org/chemicaltechnology](http://www.rsc.org/chemicaltechnology)

## i-SECTION: PROFILE

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**José Pingarrón, Complutense University of Madrid, Spain**

*The Analyst* profiles José Pingarrón, the Spanish representative on the journal's Editorial Board and Professor of Analytical Chemistry at the Complutense University of Madrid, Spain.

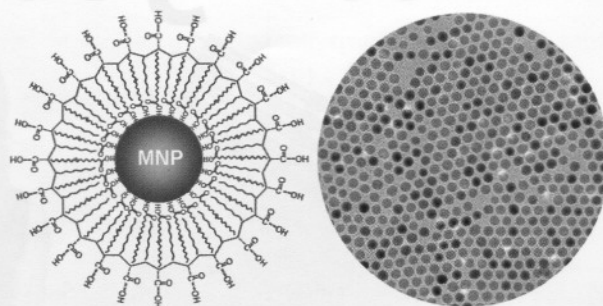


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### Ultrasensitive detection and molecular imaging with magnetic nanoparticles

Jian Yang, Jonathan Gunn, Shivang R. Dave, Miqin Zhang, Y. Andrew Wang and Xiaohu Gao\*

Monodisperse and functionalized magnetic nanoparticles (MNPs) for ultrasensitive detection and molecular imaging.



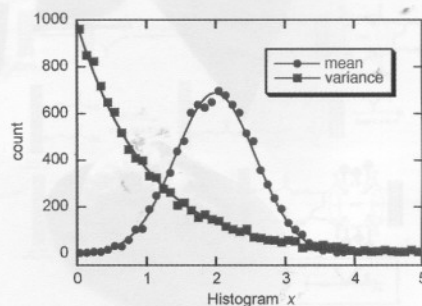
## i-SECTION: PERSPECTIVE

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### Least squares with non-normal data: estimating experimental variance functions

Joel Tellinghuisen\*

Histograms of  $10^4$  means and variances of 3 random normal variates having  $\mu = 2.0$  and  $\sigma = 1.0$ ; curves are Gaussian having  $\sigma = 1/\sqrt{3}$ , and  $\chi^2$  distribution for  $\nu = 2$  degrees of freedom.



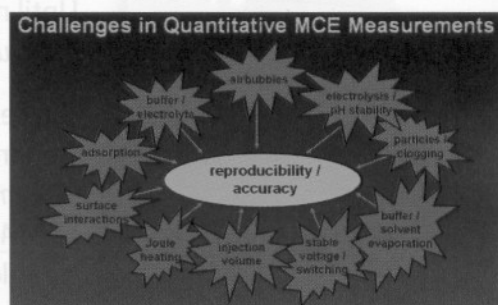
## i-SECTION: TUTORIAL REVIEW

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### Quantitative analysis by microchip capillary electrophoresis – current limitations and problem-solving strategies

Tobias Revermann, Sebastian Götz, Jens Künnemeyer and Uwe Karst\*

Characteristic problems and solutions in quantitative microchip capillary electrophoresis are presented, with particular focus on differences between the phenomena occurring during conventional CE and MCE. These include electrolysis, bubble formation, clogging, surface interactions, injection and aspects related to the power supply.



## COMMUNICATIONS

175

### Discrimination of prostate cancer cells and non-malignant cells using secondary ion mass spectrometry

Matthew J. Baker,\* Michael D. Brown, Ehsan Gazi, Noel W. Clarke, John C. Vickerman and Nicholas P. Lockyer

Time-of-Flight Secondary Ion Mass Spectrometry combined with multivariate analysis is utilised to discriminate three closely related cell lines and shows the ability of ToF-SIMS to discriminate cancerous cell lines from a non-cancerous cell line.

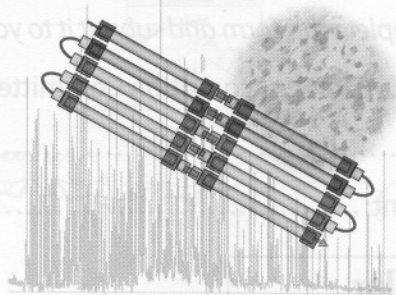


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### Using coupled monolithic rods for ultra-high peak capacity LC and LC-MS under normal LC operating pressures

Jonathan Bones, Cepta Duffy, Mirek Macka and Brett Paull\*

Coupled monolithic columns up to 1 m in total length are used with direct ESI-MS detection generating peak capacities up to 244 peaks  $\text{h}^{-1}$  at a total column backpressure of just 140 bar.



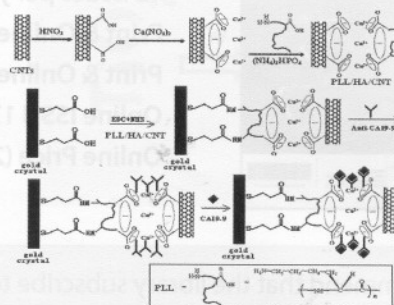
## PAPERS

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### Poly-L-lysine/hydroxyapatite/carbon nanotube hybrid nanocomposite applied for piezoelectric immunoassay of carbohydrate antigen 19-9

Yanjuan Ding, Jia Liu, Xiaoyong Jin, Haixia Lu, Guoli Shen\* and Ruqin Yu

The novelty of our technique is the induction of the formation of poly-L-lysine/hydroxyapatite/carbon nanotube (PLL/HA/CNT) hybrid nanoparticles by creating a special platform appropriate to immobilize antibodies.

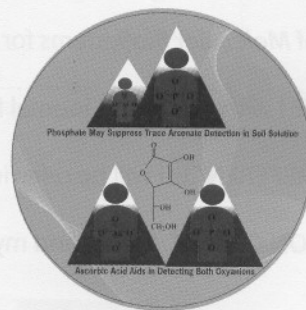


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### Novel colorimetric method overcoming phosphorus interference during trace arsenic analysis in soil solution

Konstantinos C. Makris,\* Pravin Punamiya, Dibyendu Sarkar and Rupali Datta

The proposed colorimetric method overcomes difficulties in trace arsenic detection due to much greater soluble phosphorus concentrations in soil solution. Optimized conditions using ascorbic acid aid in accurately quantifying both arsenic and phosphorus in arsenic-contaminated sites.

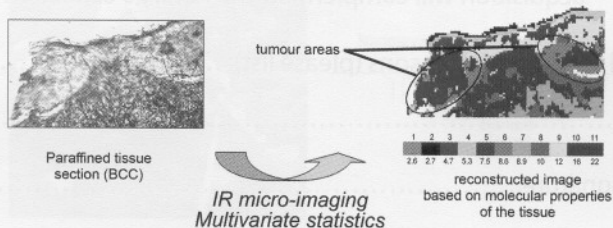


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### Combination of FTIR spectral imaging and chemometrics for tumour detection from paraffin-embedded biopsies

Elodie Ly, Olivier Piot,\* Rolf Wolthuis, Anne Durlach, Philippe Bernard and Michel Manfait

Infrared spectral imaging for histopathological recognition of tumour tissues.

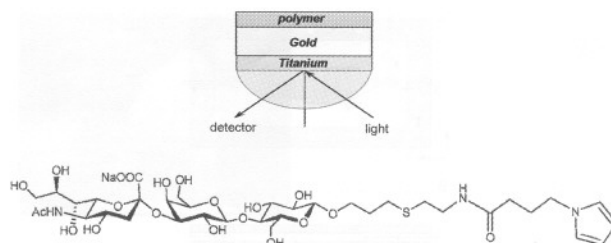


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### Detection of carbohydrate-binding proteins by oligosaccharide-modified polypyrrole interfaces using electrochemical surface plasmon resonance

Chantal Gondran, Marie-Pierre Dubois, Sébastien Fort,\* Serge Cosnier and Sabine Szunerits\*

Thin conducting polymer films bearing oligosaccharide derivatives were formed on SPR interfaces and used for the detection of carbohydrate-binding proteins.

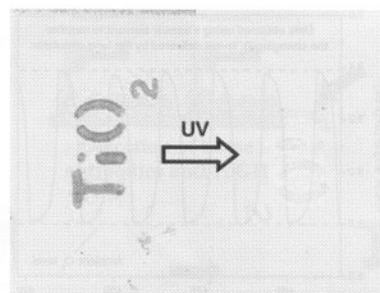


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### A solvent-based intelligence ink for oxygen

Andrew Mills\* and David Hazafy

A solvent-based, UV-activated irreversible oxygen indicator ink is described, comprising titania photocatalyst nanoparticles, a solvent-soluble methylene blue redox dye, mild reducing agent and polymer.

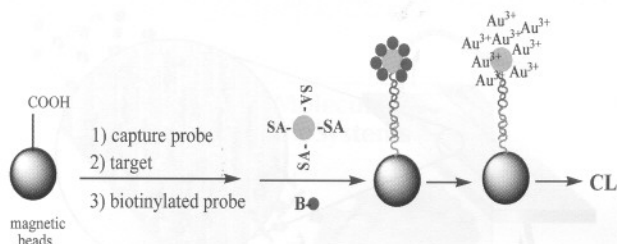


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### Colloidal gold–polystyrene bead hybrid for chemiluminescent detection of sequence-specific DNA

Aiping Fan, Choiwan Lau and Jianzhong Lu\*

A sensitive chemiluminescent (CL) detection of sequence-specific DNA has been developed by taking advantage of a magnetic separation/mixing process and the amplification feature of colloidal gold labels. Such amplified CL transduction allows detection of DNA targets down to the 100 amol level, and offers great promise for ultrasensitive detection of other biorecognition events.

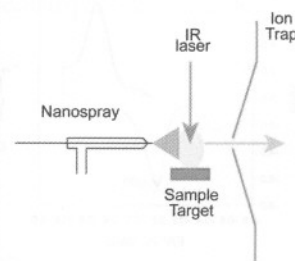
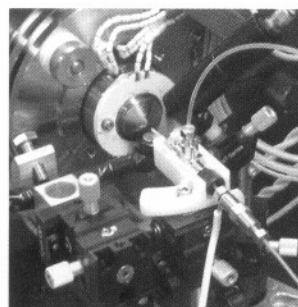


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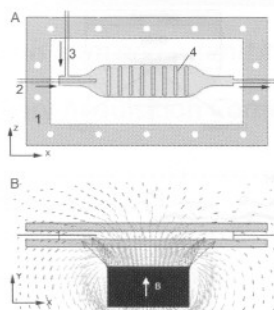
### Infrared laser-assisted desorption electrospray ionization mass spectrometry

Yohannes H. Rezenom, Jianan Dong and Kermit K. Murray\*

Infrared laser-assisted desorption electrospray ionization mass spectrometry is used for the direct analysis of water-containing samples under ambient conditions. To demonstrate the capability for direct analysis of biological fluids, blood and urine were analyzed without sample pretreatment; pharmaceutical products were also directly analyzed.



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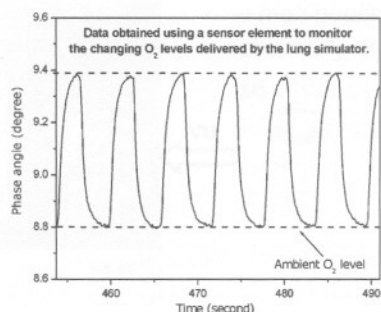


### Rapid detection of dengue virus in serum using magnetic separation and fluorescence detection

Won-Suk Chang, Hao Shang, Rushika M. Perera, Shee-mei Lok, Dagmar Sedlak, Richard J. Kuhn and Gil U Lee\*

A magnetophoretic fluorescence sensor (MFS) has been developed to rapidly detect dengue virus in serum at a sensitivity that was approximately three orders of magnitude higher than conventional solid phase immunoassays.

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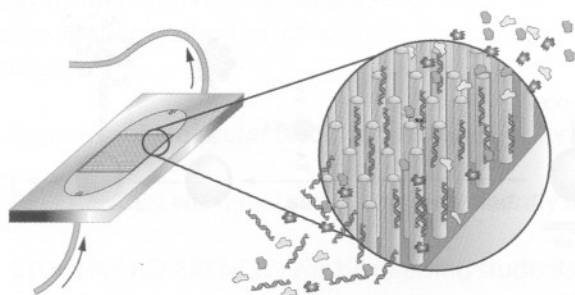


### Novel hybrid optical sensor materials for in-breath O<sub>2</sub> analysis

Clare Higgins, Dorota Wencel, Conor S. Burke, Brian D. MacCraith and Colette McDonagh\*

This study focuses on the optimisation and characterisation of novel, ORganically MODified SILicate (ORMOSIL)-based, hybrid sensor films for use in the detection of O<sub>2</sub> on a breath-by-breath basis in human health monitoring applications.

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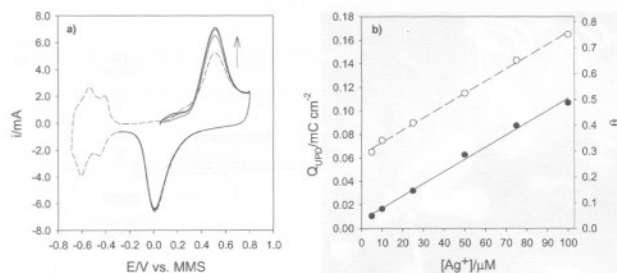


### Development of an automated DNA purification module using a micro-fabricated pillar chip

Benjamin J. Hindson, Dora M. Gutierrez, Kevin D. Ness, Anthony J. Makarewicz, Thomas R. Metz, Ujwal S. Setlur, William B. Bennett, Jeffrey M. Loge, Bill W. Colston, Jr., Paul S. Francis, Neil W. Barnett and John M. Dzenitis\*

A reusable flow-through microchip, featuring a bed of high-aspect ratio silica pillars, was interfaced with a fluid-handling module which automated the purification of *Bacillus anthracis* DNA from spiked environmental aerosol samples for PCR analysis.

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### Electrochemical characterisation and anodic stripping voltammetry at mesoporous platinum rotating disc electrodes

Pablo Lozano-Sanchez\* and Joanne M. Elliott

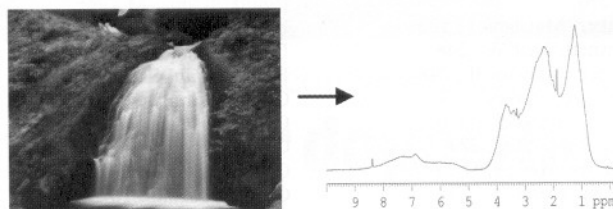
Using the technique of liquid crystal templating, a rotating disc electrode (RDE) was modified with a high surface area mesoporous platinum film; the mesoporous RDE forms a suitable system for the quantification of silver ions in solution.

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## Direct $^1\text{H}$ NMR spectroscopy of dissolved organic matter in natural waters

Buan Lam and André J. Simpson\*

A novel NMR method is described which permits the 'molecular fingerprint' of dissolved organic matter to be obtained from natural waters without pre-concentration.

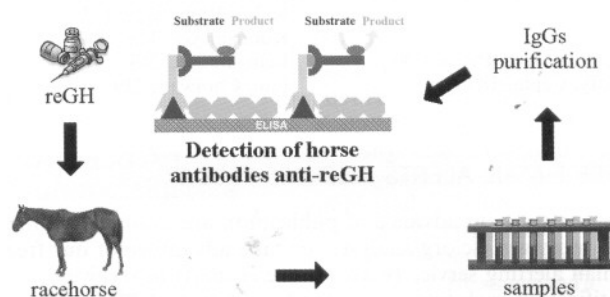


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## Detection of secondary biomarker of met-eGH as a strategy to screen for somatotropin misuse in horseracing

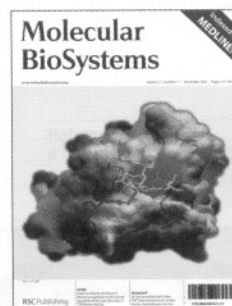
Ludovic Bailly-Chouriberry,\* Emeline Chu-Van, Gaud Pinel, Patrice Garcia, Marie-Agnès Popot, Geneviève André-Fontaine, Yves Bonnaire and Bruno Le Bizec

The identification of horse antibodies, anti-reGH, obtained from plasma or serum after caprylic acid purification is reported to assess the potential misuse of recombinant somatotropin in horseracing.



## MOLECULAR BIOSYSTEMS

It's official, *Molecular BioSystems* has separated from host journal, *Chemical Communications*, and is now a fully fledged solo publication. Its availability since launch to readers of *Chemical Communications* and the online hosts, *Organic & Biomolecular Chemistry*, *Lab on a Chip*, *The Analyst* and *Analytical Abstracts*, has ensured that *Molecular BioSystems* received a large and interdisciplinary audience from the outset. *Analyst* readers wishing to continue to read *Molecular BioSystems* now need to recommend the journal to their librarian. Fill in the online recommendation form at [www.rsc.org/libraryrecommendation](http://www.rsc.org/libraryrecommendation)



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