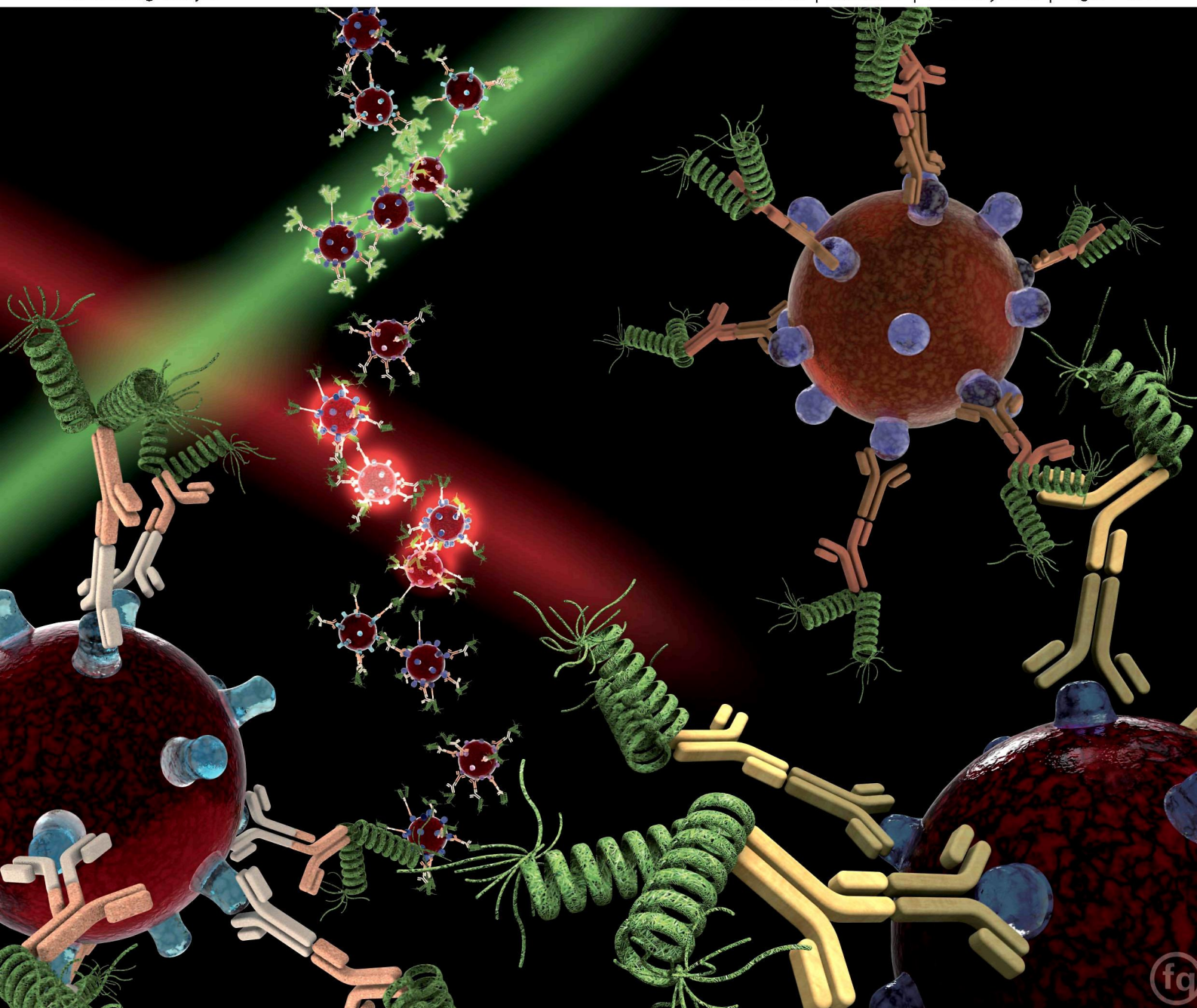


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ISSN 0003-2654

RSC Publishing

HOT ARTICLE

Nathalie Gabriëlle Esther Smits *et al.*
Multiplex flow cytometric immunoassay for
serum biomarker profiling of recombinant bovine somatotropin



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IN THIS ISSUE

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Cover
See Nathalie Gabriëlle Esther Smits *et al.*, pp. 111–117.
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Inside cover
See Royston Goodacre *et al.*, pp. 118–122.
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EDITORIALS

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Analyst—faster, higher, stronger in 2013!

Happy New Year from Analyst and RSC Publishing! May Copsey and Paul Bohn take this opportunity to look at highlights from the journal in 2012 and look forward to 2013.



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Editorial Board profiles

Analyst introduces the profiles of the Editorial Board members for 2013.

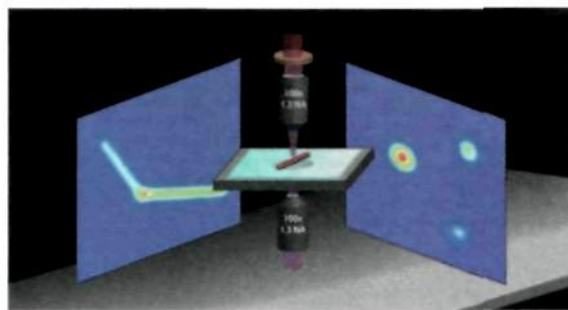


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Optical detection of single nano-objects by transient absorption microscopy

Shun Shang Lo, Mary Sajini Devadas, Todd A. Major and Gregory V. Hartland*

In recent years there has been considerable effort in developing ultra-sensitive imaging techniques based on absorption.

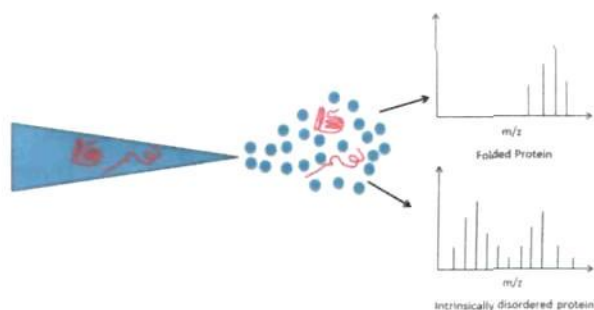


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Mass spectrometry methods for intrinsically disordered proteins

Rebecca Beveridge, Quentin Chappuis, Cait Macphee and Perdita Barran*

In the last ten years mass spectrometry has emerged as a powerful biophysical technique capable of providing unique insights into the structure and dynamics of proteins.



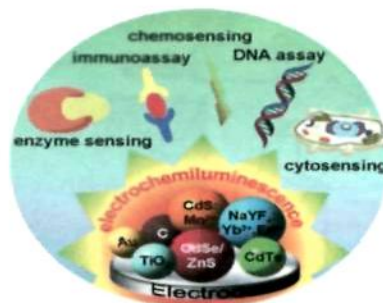
CRITICAL REVIEWS

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Electrogenerated chemiluminescence of nanomaterials for bioanalysis

Shengyuan Deng and Huangxian Ju*

Recent advances in the electrochemiluminescence of nanomaterials and their application in bioanalysis are reviewed.

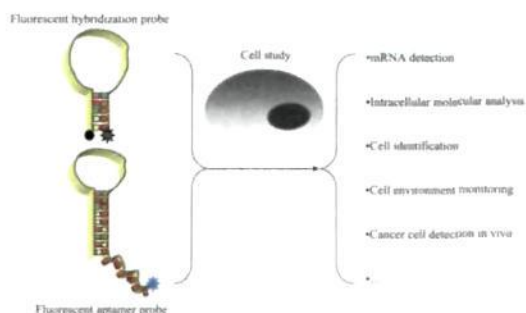


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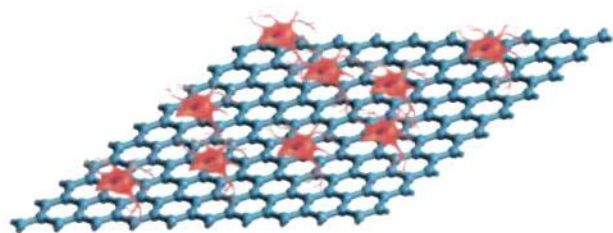
Recent advances in fluorescent nucleic acid probes for living cell studies

Kemin Wang,* Jin Huang, Xiaohai Yang, Xiaoxiao He and Jianbo Liu

General requirements for, design schemes and recent developments in fluorescent nucleic acid probes for living cells are reviewed and discussed.



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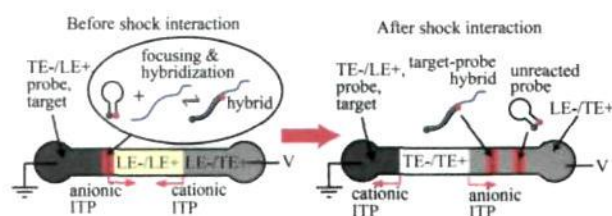
Graphene and its derivatives for cell biotechnology

Mei Yang, Jun Yao and Yixiang Duan*

The focus of this Tutorial Review is to emphasize the current situation and significance of using this new kind of two-dimensional material in the hot and emerging fields that are closely related to human life quality, for instance, cell biochemistry, bioimaging along with other frontier areas.

COMMUNICATIONS

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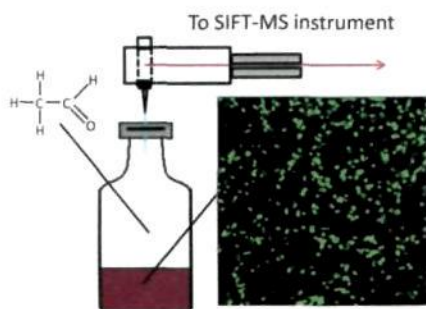


Integration of rapid DNA hybridization and capillary zone electrophoresis using bidirectional isotachopheresis

Supreet S. Bahga, Crystal M. Han and Juan G. Santiago*

We present a method for rapid, sequence-specific detection of multiple DNA fragments by integrating isotachopheresis (ITP) based DNA hybridization and capillary zone electrophoresis (CZE) using bidirectional ITP.

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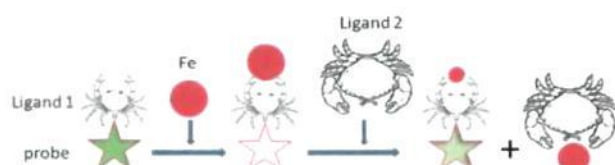


Quantification by SIFT-MS of acetaldehyde released by lung cells in a 3D model

Abigail V. Rutter, Thomas W. E. Chippendale, Ying Yang, Patrik Spaněl, David Smith and Josep Sulé-Suso*

Production of acetaldehyde by malignant and non-malignant lung cells is more efficient in 3D models as compared to 2D conditions.

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A novel fluorescence method for determination of pFe³⁺

Yongmin Ma, Yuanyuan Xie and Robert C. Hider*

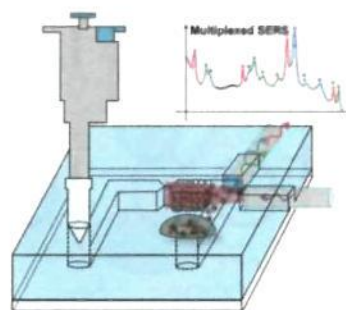
The fluorescence of a chelating probe was quenched by addition of iron and the fluorescence was partly recovered by a competing ligand.

100

Multiplexed detection of aquaculture fungicides using a pump-free optofluidic SERS microsystem

Soroush H. Yazdi and Ian M. White*

We report the multiplexed detection of pesticides regulated in aquaculture using an optofluidic SERS device optimized for portable field-based applications.

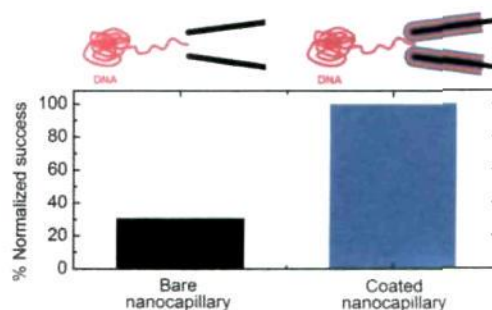


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Lipid-coated nanocapillaries for DNA sensing

Silvia Hernández-Ainsa, Christoph Muus, Nicholas A. W. Bell, Lorenz J. Steinbock, Vivek V. Thacker and Ulrich F. Keyser*

Lipid coating is shown here as a simple and efficient way to improve the success rate of glass nanopores as biosensors for DNA detection.

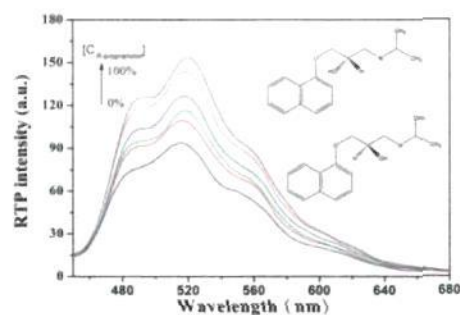


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A simple method for the determination of enantiomeric composition of propranolol enantiomers

Yanli Wei,* Hui Kang, Yanfang Ren, Guojie Qin, Shaomin Shuang and Chuan Dong*

A novel strategy to determine the enantiomeric composition based on β -cyclodextrin as the chiral host and bromocyclohexane as the heavy atom can detect propranolol enantiomers with a better speediness and validity.



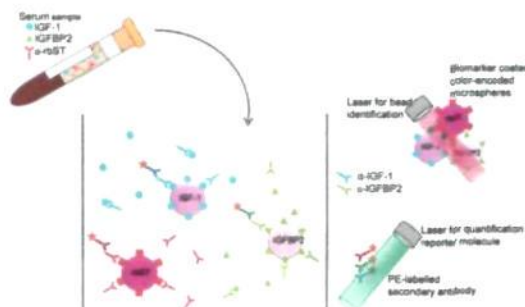
PAPERS

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Multiplex flow cytometric immunoassay for serum biomarker profiling of recombinant bovine somatotropin

Nathalie Gabriëlle Esther Smits,* Susann Katrina Julie Ludwig, Grisha Van der Veer, Maria Gabriëlle Eleonore Gerarda Bremer and Michel Wilhelmus Franciscus Nielen

A robust multiplex flow cytometric immunoassay using color encoded microspheres for detection of IGF-1, IGFBP2 and rbST-induced antibodies in serum samples of dairy cows was developed. A unique multiple biomarker immunoassay provides detailed biomarker profiles in serum, which when combined enables pinpointing rbST (ab)use in cattle.

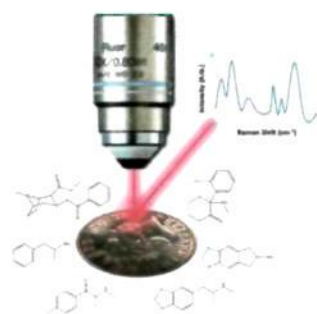


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2p or not 2p: tuppence-based SERS for the detection of illicit materials

Samuel Mabbott, Alex Eckmann, Cinzia Casiraghi and Royston Goodacre*

The rapid synthesis of SERS active metallic surfaces on 2 pence coins allows for the discrimination of 1 legal and 5 illegal drugs of abuse.

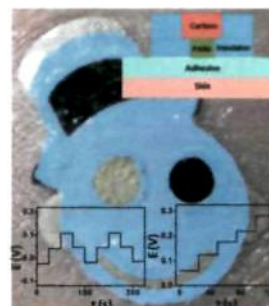


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Tattoo-based potentiometric ion-selective sensors for epidermal pH monitoring

Amay J. Bandodkar, Vinci W. S. Hung, Wenzhao Jia, Gabriela Valdés-Ramírez, Joshua R. Windmiller, Alexandra G. Martínez, Julian Ramírez, Garrett Chan, Kagan Kerman and Joseph Wang*

Temporary transfer tattoo-based all-solid contact potentiometric sensors are fabricated by combining screen printing, temporary tattoo and conducting polymer technology and evaluated for real-time epidermal pH monitoring.

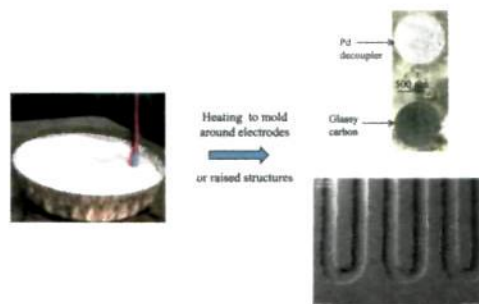


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Integration of multiple components in polystyrene-based microfluidic devices part I: fabrication and characterization

Alicia S. Johnson, Kari B. Anderson, Stephen T. Halpin, Douglas C. Kirkpatrick, Dana M. Spence* and R. Scott Martin*

In Part I of a two-part series, we describe a simple and inexpensive approach to fabricate polystyrene devices that is based upon melting polystyrene (from either a Petri dish or powder form) against PDMS molds or around electrode materials.

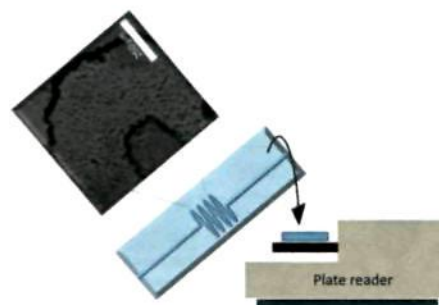


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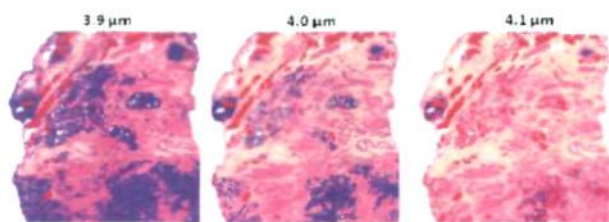
Integration of multiple components in polystyrene-based microfluidic devices part II: cellular analysis

Kari B. Anderson, Stephen T. Halpin, Alicia S. Johnson, R. Scott Martin* and Dana M. Spence*

In Part II of this series describing the use of polystyrene (PS) devices for microfluidic-based cellular assays: various cellular types and detection strategies are employed to determine three fundamental assays often associated with cells.



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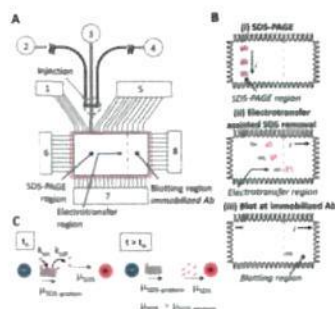


The inherent problem of transfection-mode infrared spectroscopic microscopy and the ramifications for biomedical single point and imaging applications

Paul Bassan, Joe Lee, Ashwin Sachdeva, Juliana Pissardini, Konrad M. Dorling, John S. Fletcher, Alex Henderson and Peter Gardner*

The non-linear absorbance as a function of sample thickness resulting from the electric-field standing wave, associated with using transfection-mode FTIR and the subsequent ramifications for imaging and classification in disease diagnostics are explored.

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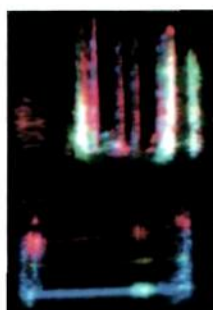


Microfluidic integration of Western blotting is enabled by electrotransfer-assisted sodium dodecyl sulfate dilution

Chenlu Hou and Amy E. Herr*

Electrotransfer assisted SDS dilution and protein renaturation enabled microfluidic integration for Western blotting.

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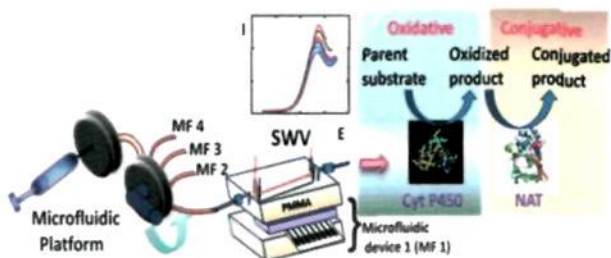


Capillary electrophoresis with three-color fluorescence detection for the analysis of glycosphingolipid metabolism

Richard B. Keithley, Alison S. Rosenthal, David C. Essaka, Hidenori Tanaka, Yayoi Yoshimura, Monica M. Palcic, Ole Hindsgaul and Norman J. Dovichi*

Here we monitor glycosphingolipid metabolism using capillary electrophoresis with three-color laser-induced fluorescence detection.

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Screening reactive metabolites bioactivated by multiple enzyme pathways using a multiplexed microfluidic system

Dhanuka P. Wasalathanthri, Ronaldo C. Faria, Spundana Malla, Amit A. Joshi, John B. Schenkman and James F. Rusling*

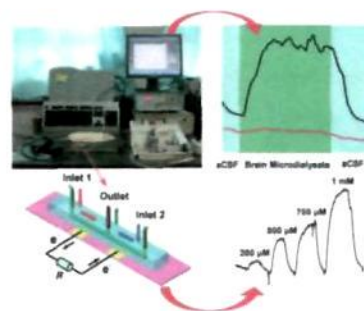
An electrochemical microfluidic system to detect reactive metabolites generating from multi-enzyme pathways to mimic natural human drug metabolism is reported.

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Biofuel cell-based self-powered biogenerators for online continuous monitoring of neurochemicals in rat brain

Hanjun Cheng, Ping Yu, Xulin Lu, Yuqing Lin, Takeo Ohsaka and Lanqun Mao*

The first demonstration of biofuel cell-based self-powered biogenerators for selective online monitoring of neurochemicals in the brain of living rats.

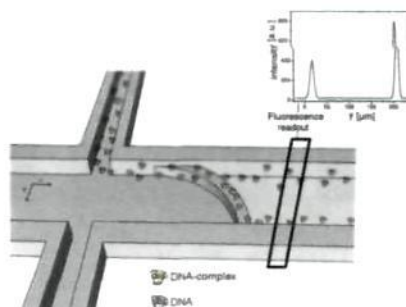


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Fast and continuous-flow separation of DNA-complexes and topological DNA variants in microfluidic chip format

Martina Viefhues,* Jan Regtmeier and Dario Anselmetti

DNA and protein–DNA-complexes are continuously and efficiently separated at a microchannel-spanning ridge by the non-invasive technique of electrodeless dielectrophoresis.

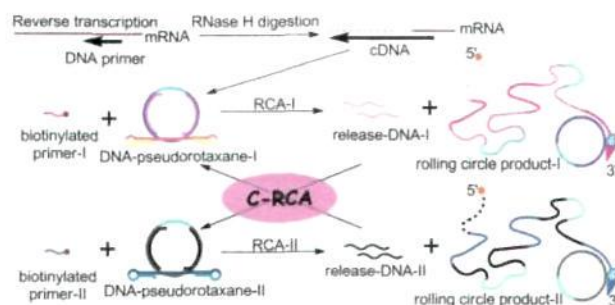


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Ultrasensitive detection of mRNA extracted from cancerous cells achieved by DNA rotaxane-based cross-rolling circle amplification

Sai Bi,* Yangyang Cui and Li Li

A DNA pseudorotaxane superstructure is converted into a "genuine" DNA rotaxane to initiate cross-rolling circle amplification upon introduction of cDNA that is specific to target mRNA.

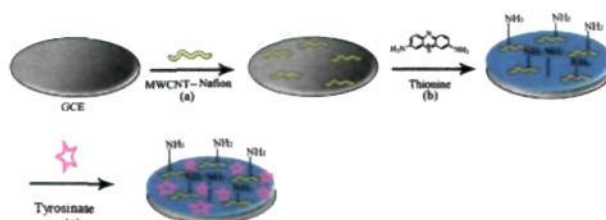


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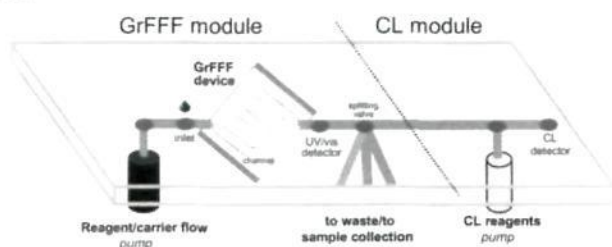
A biosensor fabricated by incorporation of a redox mediator into a carbon nanotube/nafion composite for tyrosinase immobilization: detection of matairesinol, an endocrine disruptor

Jahangir Ahmad Rather, Sanaz Pilehvar and Karolien De Wael*

Fabrication of a biosensor for the detection of the endocrine disruptor matairesinol.



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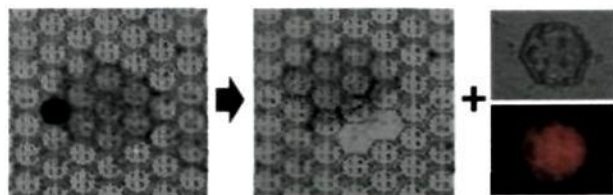


Gravitational field-flow fractionation integrated with chemiluminescence detection for a self-standing point-of-care compact device in bioanalysis

S. Casolari, B. Roda,* M. Mirasoli, M. Zangheri, D. Patrono, P. Reschiglian and A. Roda

A "Point-Of-Care" system integrating gravitational field-flow fractionation with chemiluminescence detection was developed for clean-up and analysis of biological fluids.

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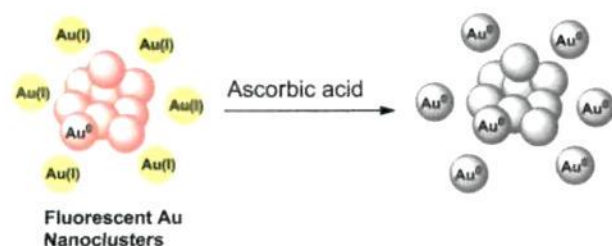


Efficient division and sampling of cell colonies using microcup arrays

Jeng-Hao Pai, Kimberly Kluckman, Dale O. Cowley, Donna M. Bortner, Christopher E. Sims and Nancy L. Allbritton*

An efficient microscale technique was demonstrated for sampling microscopic colonies followed by biochemical or genetic assay of the colony fragment for a desired trait.

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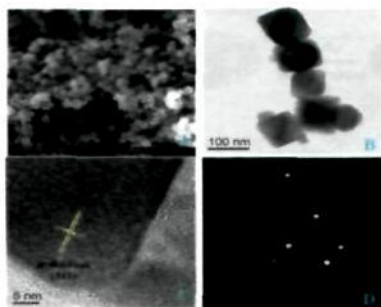


An ascorbic acid sensor based on protein-modified Au nanoclusters

Xianxiang Wang, Peng Wu, Xiandeng Hou* and Yi Lv*

Ascorbic acid changes the oxidation state of protein-modified Au nanoclusters, thus turning off their fluorescence.

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Dual-channel cathodic electrochemiluminescence of luminol induced by injection of hot electrons on a niobate semiconductor modified electrode

Huifeng Xu, Hongzhi Ye, Xi Zhu, Shijing Liang, Longhua Guo, Zhenyu Lin, Xianxiang Liu* and Guonan Chen*

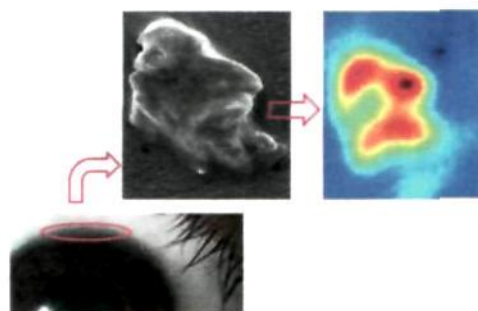
In this paper, a new niobate semiconductor photocatalyst $\text{Sr}_{0.4}\text{H}_{1.2}\text{Nb}_2\text{O}_6 \cdot \text{H}_2\text{O}$ (HSN) nanoparticle was applied to investigate the cathodic electrochemiluminescent (ECL) behavior of luminol for the first time.

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Sub-cellular spectrochemical imaging of isolated human corneal cells employing synchrotron radiation-based Fourier-transform infrared microspectroscopy

Simon W. Fogarty, Imran I. Patel, Júlio Trevisan, Takahiro Nakamura, Carol J. Hirschmugl, Nigel J. Fullwood and Francis L. Martin*

Imaging using high-resolution synchrotron radiation-based FTIR microspectroscopy of individual stem cells, transit-amplifying cells and terminally-differentiated cells isolated from living human cornea.



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Portable ceria nanoparticle-based assay for rapid detection of food antioxidants (NanoCerac)

Erica Sharpe, Thalia Frasco, Daniel Andreescu and Silvana Andreescu*

NanoCerac—a portable paper based antioxidant sensor—is developed using immobilized ceria nanoparticles which change color after interaction with antioxidants by means of redox and surface chemistry reactions.

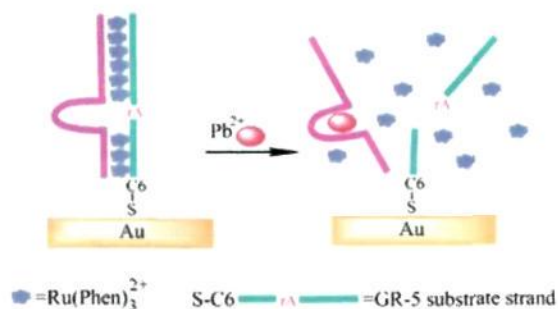


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Electrochemiluminescent lead biosensor based on GR-5 lead-dependent DNAzyme for Ru(phen)₃²⁺ intercalation and lead recognition

Ai Gao, Chun-Xia Tang, Xi-Wen He and Xue-Bo Yin*

A label-free electrochemiluminescent lead biosensor was developed based on GR-5 lead-dependent DNAzyme for Ru(phen)₃²⁺ intercalation and lead identification. The hybridization of DNAzyme and its substrate was used for the intercalation of Ru(phen)₃²⁺ and lead identification. Lead ions achieved the substrate cleavage at the scissile ribo-adenine and the release of Ru(phen)₃²⁺.

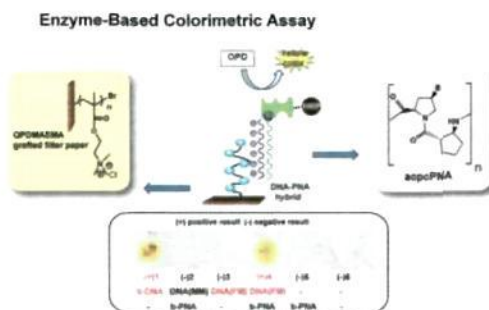


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Positively charged polymer brush-functionalized filter paper for DNA sequence determination following Dot blot hybridization employing a pyrrolidinyl peptide nucleic acid probe

Praethong S. Laopa, Tirayut Vilaivan and Voravee P. Hoven*

As inspired by the Dot blot analysis, a new paper-based platform for colorimetric detection of specific DNA sequences employing peptide nucleic acid (PNA) as a probe has been developed.

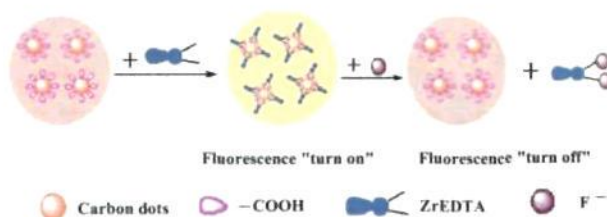


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Zr(H₂O)₂EDTA modulated luminescent carbon dots as fluorescent probes for fluoride detection

Jia-Ming Liu,* Li-ping Lin, Xin-Xing Wang, Li Jiao, Ma-Lin Cui, Shu-Lian Jiang, Wen-Lian Cai, Li-Hong Zhang and Zhi-Yong Zheng

A novel Zr(CDs-COO)₂EDTA on-off fluorescent probe was designed which emitted a strong and stable fluorescence signal in the "on" state, but switched "off" when the fluorescence signal was quenched with the addition of F⁻ ions.

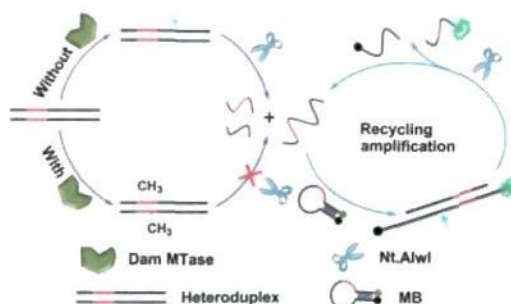


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Methylation-blocked enzymatic recycling amplification for highly sensitive fluorescence sensing of DNA methyltransferase activity

Feng Chen and Yongxi Zhao*

A fluorescent sensing strategy is developed which rapidly detects DNA methyltransferase activity, with high sensitivity, based on methylation-blocked enzymatic recycling amplification.

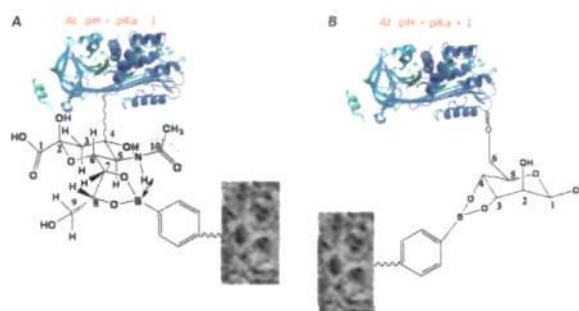


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Fine-tuning the specificity of boronate affinity monoliths toward glycoproteins through pH manipulation

Yue Lu, Zijun Bie, Yunchun Liu and Zhen Liu*

The specificity of boronate affinity monoliths towards sialylated and nonsialylated glycoproteins can be fine-tuned using a pH manipulation strategy.

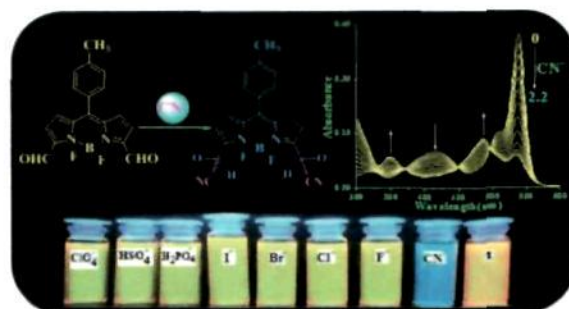


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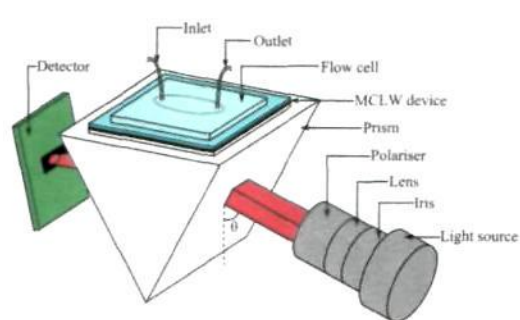
3,5-Diformyl-borondipyromethene for selective detection of cyanide anion

Sheri Madhu, Santanu Kumar Basu, Sameer Jadhav and Mangalampalli Ravikanth*

Highly selective colorimetric and chemodosimetric sensor for the detection of CN⁻ anion over other common inorganic anions by nucleophilic addition of CN⁻ to 3,5-diformyl-borondipyromethene and conversion to the cyanohydrin form.



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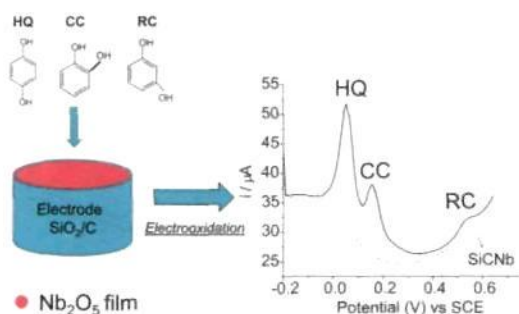


Absorption spectroscopy in microfluidic flow cells using a metal clad leaky waveguide device with a porous gel waveguide layer

Ruchi Gupta, Behnam Bastani, N. J. Goddard and Bruce Grieve

Broadband absorption spectroscopy is advantageous because the full spectral profile of an analyte can permit identification of species.

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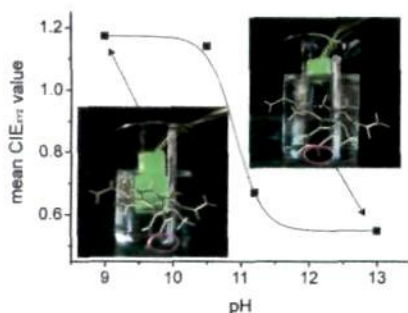


Simultaneous electroanalytical determination of hydroquinone and catechol in the presence of resorcinol at an SiO_2/C electrode spin-coated with a thin film of Nb_2O_5

Thiago C. Canevari,* Leliz T. Arenas, Richard Landers, Rogério Custodio and Yoshitaka Gushikem

An Nb_2O_5 film was formed on the surface of a carbon ceramic material, SiO_2/C , using the spin-coating technique. Hydroquinone and catechol could be oxidized at this electrode in the presence of resorcinol. Good separation peaks between hydroquinone, catechol and resorcinol allowed the simultaneous determination of isomers.

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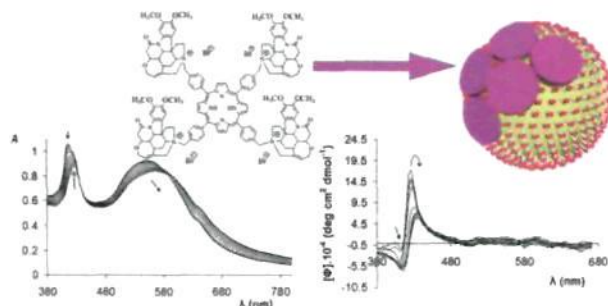


A highly fluorescent pH sensing membrane for the alkaline pH range incorporating a BODIPY dye

Mandy Hecht, Werner Kraus and Knut Rurack*

A robust and re-usable dipstick-type fluorescent pH sensor for the alkaline pH range was developed by embedding a brightly fluorescent boron-dipyrrromethene (BODIPY) dye bearing an acidic phenol moiety into a polyurethane matrix immobilized on a 3D epoxy-functionalized polymer support.

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Receptor modified gold and silver nanoparticles: effect on interactions with oxoanions

Lenka Veverková, Pavel Žvátora, Kamil Záruba and Vladimír Král*

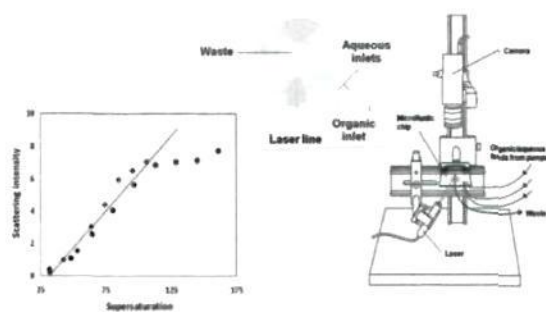
Herein we present a supramolecular non-covalent approach for the modification of gold nanoparticles (GNPs) and silver nanoparticles (SNPs) with porphyrins for oxoanion sensing.

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Using droplet-based microfluidic technology to study the precipitation of a poorly water-soluble weakly basic drug upon a pH-shift

Francine Edwards, Christina Tsakmaka, Stephan Mohr, Peter R. Fielden, Nick J. Goddard, Jonathan Booth and Kin Y. Tam*

A droplet-based microfluidic device to study the precipitation of a poorly water-soluble weakly basic drug upon a pH-shift.

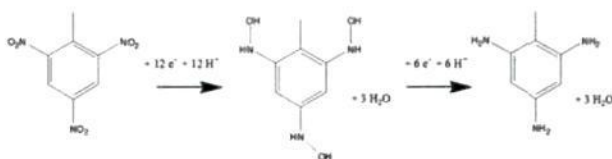


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Disposable screen-printed sensors for the electrochemical detection of TNT and DNT

J. Sarah Caygill, Stuart D. Collyer, Joanne L. Holmes, Frank Davis and Séamus P. J. Higson*

An electrochemical sensor for nitroaromatic explosives using commercial screen-printed electrodes is reported, with a 0.4 μM detection limit for TNT.

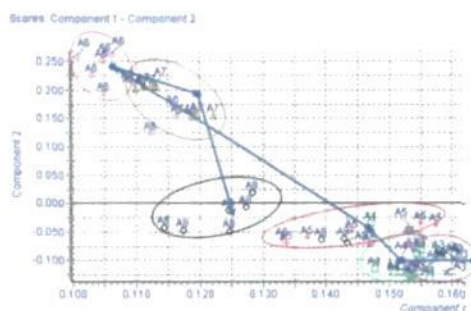


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Metabolomics study on the hepatoprotective effect of scopolamine using ultra-performance liquid chromatography/electrospray ionization quadrupole time-of-flight mass spectrometry

Aihua Zhang, Hui Sun,* Shengshan Dou, Wenjun Sun, Xihong Wu, Ping Wang and Xijun Wang*

Trajectory analysis of PCA score plots for liver injury in positive mode.



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A novel route to prepare LaNiO_3 perovskite-type oxide nanofibers by electrospinning for glucose and hydrogen peroxide sensing

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An electrospun LaNiO_3 nanofibers modified electrode is developed as a nonenzymatic H_2O_2 sensor and glucose biosensor.

