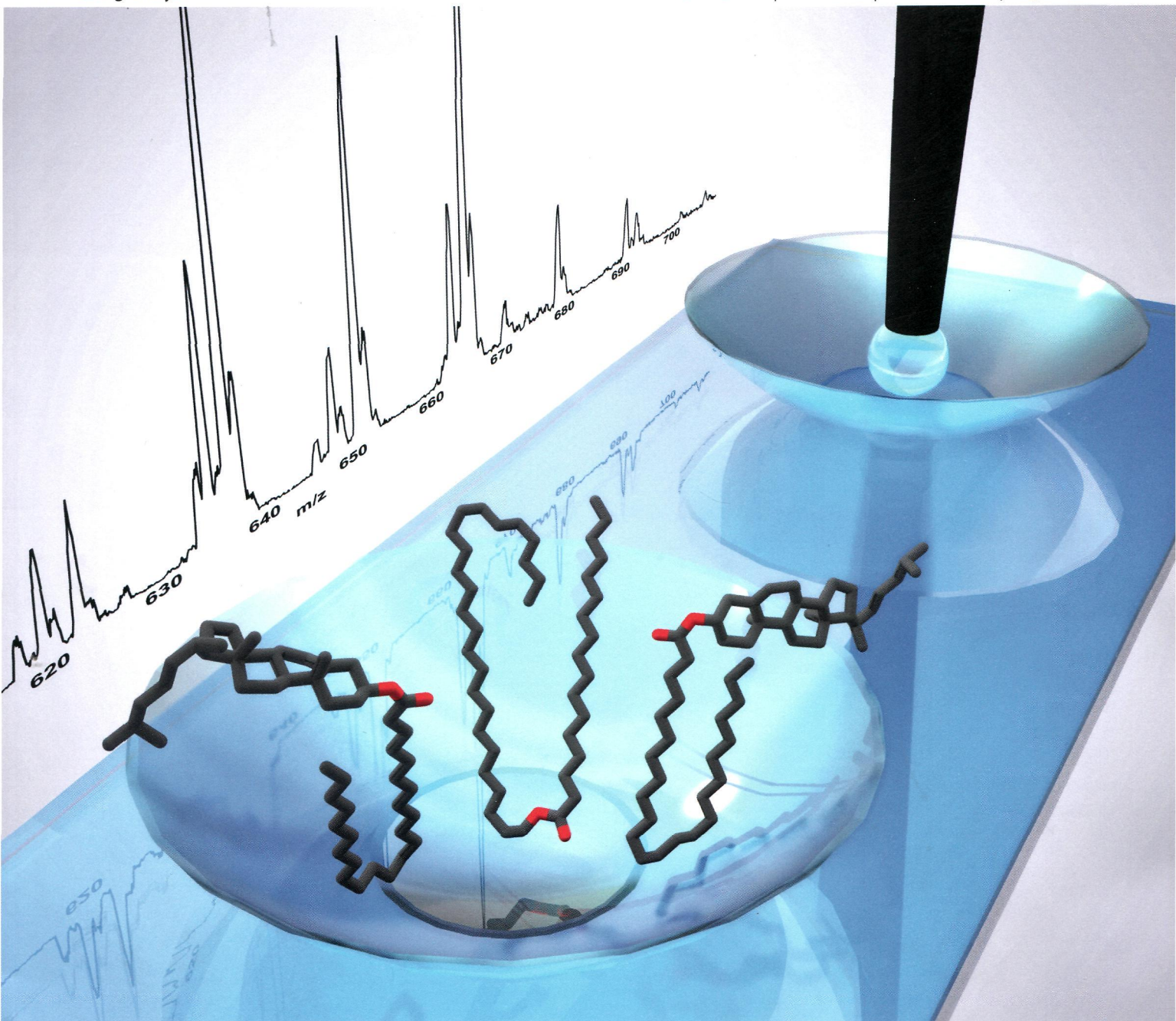


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# Analyst

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RSC Publishing

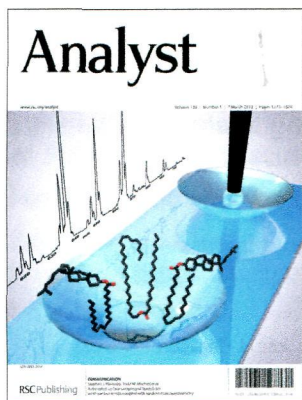
**COMMUNICATION**

Stephen J. Blanksby, Todd W. Mitchell *et al.*  
Automated surface sampling of lipids from



## IN THIS ISSUE

ISSN 0003-2654 CODEN ANALAO 138(5) 1273–1604 (2013)



### Cover

See Stephen J. Blanksby, Todd W. Mitchell *et al.*, pp. 1316–1320. Image reproduced by permission of Todd Mitchell from *Analyst*, 2013, **138**, 1316.



### Inside cover

See Taesung Kim *et al.*, pp. 1370–1378. Image reproduced by permission of Taesung Kim from *Analyst*, 2013, **138**, 1370.

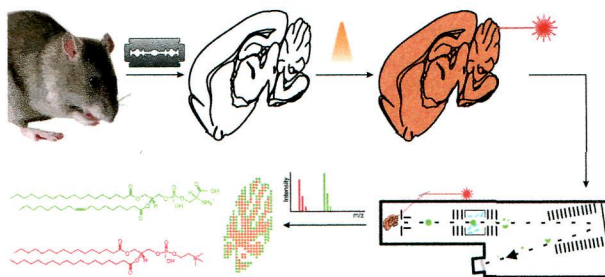
## CRITICAL REVIEW

1289

### Lipid imaging by mass spectrometry – a review

David Gode and Dietrich A. Volmer\*

A comprehensive review of current mass spectrometry imaging techniques and their application to lipids.



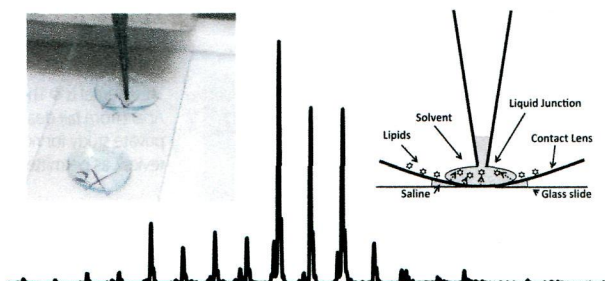
## COMMUNICATIONS

1316

### Automated surface sampling of lipids from worn contact lenses coupled with tandem mass spectrometry

Simon H. J. Brown, Liam H. Huxtable, Mark D. P. Willcox, Stephen J. Blanksby\* and Todd W. Mitchell\*

A method to characterize lipid deposits directly from worn contact lenses was developed utilizing liquid extraction surface analysis coupled to tandem mass spectrometry.

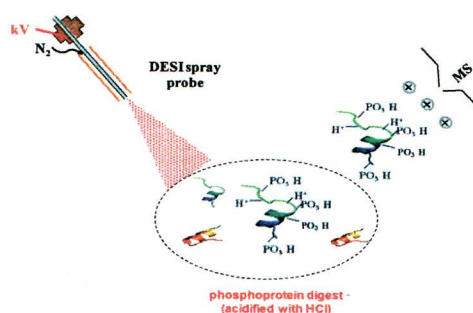


1321

### Highly efficient ionization of phosphopeptides at low pH by desorption electrospray ionization mass spectrometry

Ning Pan, Pengyuan Liu, Weidong Cui, Bo Tang, Jingmin Shi and Hao Chen\*

A fast and novel DESI-MS method is developed for effective ionization of phosphopeptides in complicated mixtures.

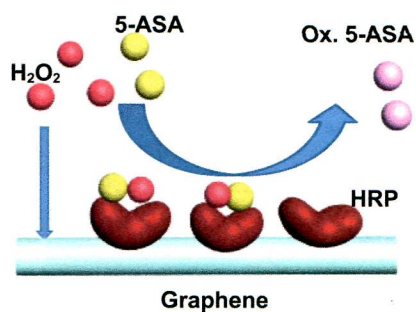


1325

### Electrical, enzymatic graphene biosensing of 5-aminosalicylic acid

Pratima Labroo and Yue Cui\*

We report an electrical biosensing of 5-aminosalicylic acid based on a peroxidase-immobilized graphene sensor.

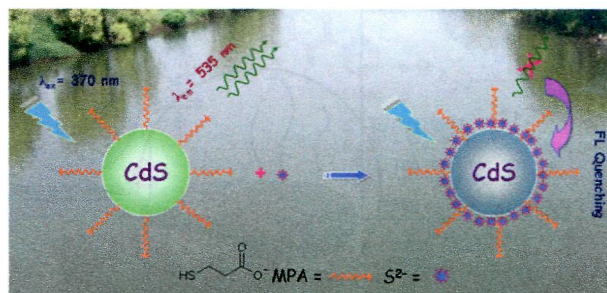


1329

### Direct detection of sulfide ions [S<sup>2-</sup>] in aqueous media based on fluorescence quenching of functionalized CdS QDs at trace levels: analytical applications to environmental analysis

Anil H. Gore, Sandip B. Vatre, Prashant V. Anbhule, Sung-Hwan Han, Shivajirao R. Patil and Govind B. Kolekar\*

We report functionalized CdS QDs as a novel fluorescent probe for highly selective and ultrasensitive detection of S<sup>2-</sup> from environmental water samples without pretreatment.

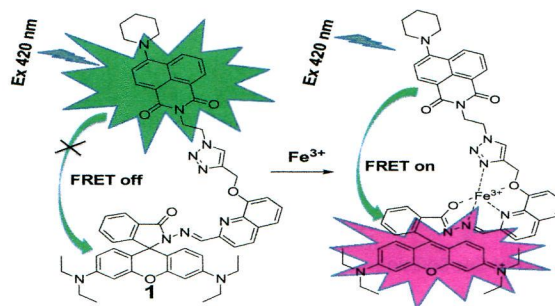


1334

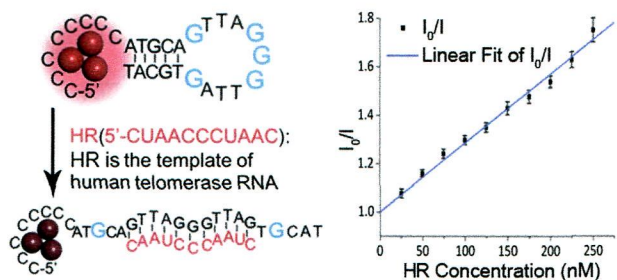
### A highly selective and efficient single molecular FRET based sensor for ratiometric detection of Fe<sup>3+</sup> ions

Narendra Reddy Cherreddy, Sathiah Thennarasu\* and Asit Baran Mandal\*

A selective and efficient FRET based sensor for the ratiometric detection of Fe<sup>3+</sup> in aqueous and biological samples is presented.



1338

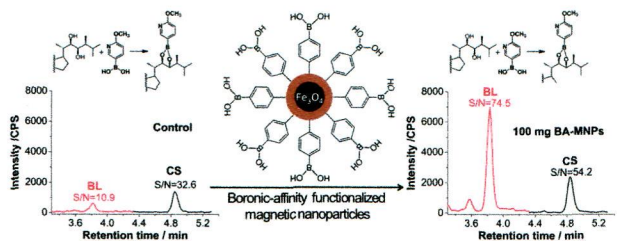


**Luminescent silver nanoclusters anchored by oligonucleotides detect human telomerase ribonucleic acid template**

Yueteng Wei, Ru Liu, Zhipeng Sun, Yaling Wang, Yanyan Cui, Yuliang Zhao, Zhifang Cai and Xueyun Gao\*

A luminescent Ag nanoclusters-DNA probe is synthesized for potential application in human telomerase detection.

1342

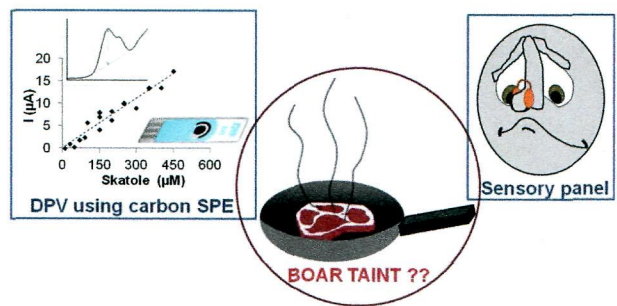


**A dual role of boronate affinity in high-sensitivity detection of vicinal diol brassinosteroids from sub-gram plant tissues via UPLC-MS/MS**

Peiyong Xin, Jijun Yan, Jinshi Fan, Jinfang Chu\* and Cunyu Yan\*

A dual role of boronate affinity highly improved the detection sensitivity of vicinal diol brassinosteroids from sub-gram plant tissues.

1346



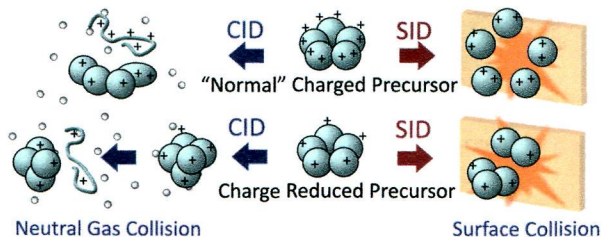
**Voltammetric discrimination of skatole and indole at disposable screen printed electrodes**

José-María Maesa, Francesc-Xavier Muñoz-Pascual and Eva Baldrich\*

Effective discrimination of skatole and indole by differential pulse voltammetry at cheap and disposable screen printed electrodes.

PAPERS

1353



**Impact of charge state on gas-phase behaviors of noncovalent protein complexes in collision induced dissociation and surface induced dissociation**

Mowei Zhou, Shai Dagan and Vicki H. Wysocki\*

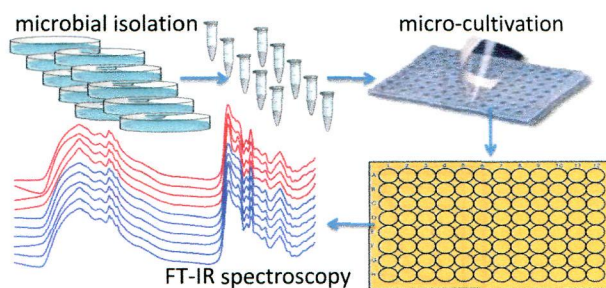
Unique information from surface collisions of gas-phase charge-tuned protein complexes adds to the current understanding from activation by gas collisions.

1363

### High-throughput phenotyping of uropathogenic *E. coli* isolates with Fourier transform infrared spectroscopy

Haitham AlRabiah, Elon Correa, Mathew Upton and Royston Goodacre\*

A micro-culture approach is developed for the growth of bacteria and interfaced with FT-IR spectroscopy which allows high throughput and highly reproducible metabolic fingerprints to be collected.

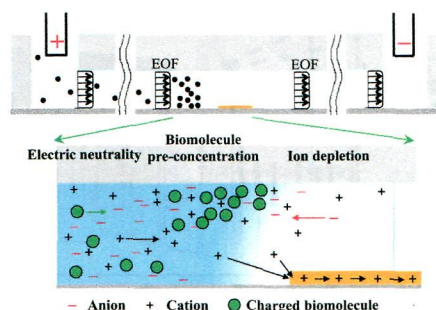


1370

### Ion concentration polarization in a single and open microchannel induced by a surface-patterned perm-selective film

Minseok Kim, Mingjie Jia and Taesung Kim\*

We present a novel ion concentration polarization mechanism induced by a surface-patterned Nafion film in single and open microchannels.

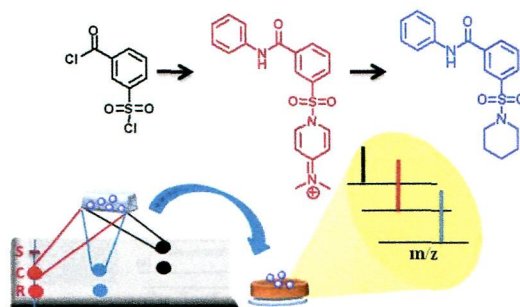


1379

### Direct monitoring of chemical transformations by combining thin layer chromatography with nanoparticle-assisted laser desorption/ionization mass spectrometry

Chun-Chi Chen, Yung-Lin Yang, Chun-Lin Ou, Chih-Hung Chou, Chih-Chuang Liaw and Po-Chiao Lin\*

A platform for direct monitoring of chemical transformations has been developed to accelerate the studies in organic synthesis and natural product discovery.

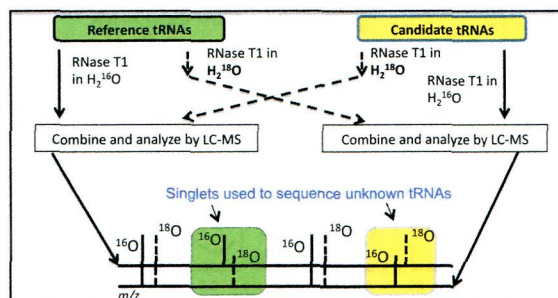


1386

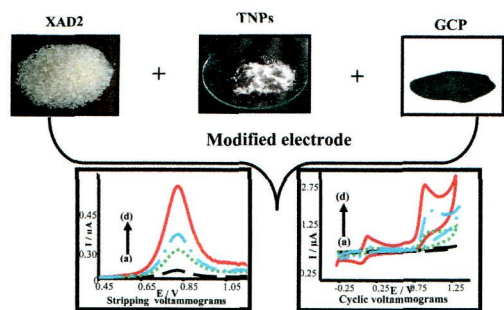
### Mass spectrometry sequencing of transfer ribonucleic acids by the comparative analysis of RNA digests (CARD) approach

Siwei Li and Patrick A. Limbach\*

Sequencing of tRNAs by comparative analysis of RNA digests yields >75% of tRNA sequence information, including modification status, in two simple steps.



1395

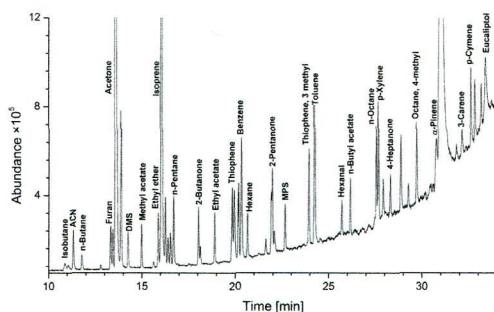


### Adsorptive stripping voltammetric determination of imipramine, trimipramine and desipramine employing titanium dioxide nanoparticles and an Amberlite XAD-2 modified glassy carbon paste electrode

Bankim J. Sanghavi and Ashwini K. Srivastava\*

Synergistic effect of Amberlite XAD2 and TiO<sub>2</sub> nanoparticles in a glassy carbon paste electrode has led to a very sensitive determination of imipramine, trimipramine and desipramine in pharmaceuticals, blood serum and urine samples.

1405

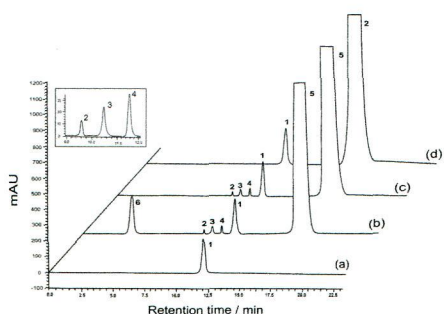


### Stability of selected volatile breath constituents in Tedlar, Kynar and Flexfilm sampling bags

Paweł Mochalski,\* Julian King, Karl Unterkofler and Anton Amann

The stability of 41 selected breath constituents in three types of polymer sampling bags, Tedlar, Kynar, and Flexfilm, was investigated using solid phase microextraction and gas chromatography mass spectrometry.

1419

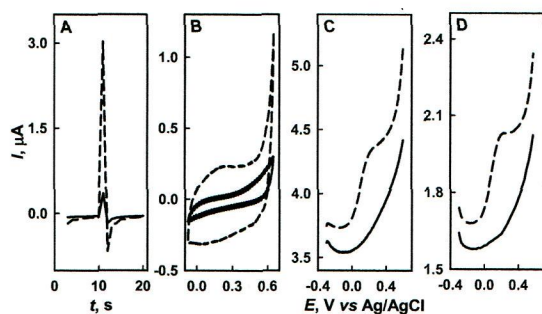


### Assessment of recombinant human parathyroid hormone: correlation of LC methods with bioassays

Fernanda P. Stamm, Guilherme Z. Calegari, Guilherme W. de Freitas, Ricardo B. Souto, Larissa P. Porto, Clóvis D. A. Cardoso Jr. and Sérgio L. Dalmora\*

Reversed-phase liquid chromatography (RP-LC) and size exclusion liquid chromatography (SE-LC) methods were validated for the assessment of recombinant human parathyroid hormone (rhPTH 1-34).

1427



### Determination of antibodies against human growth hormone using a direct immunoassay format and different electrochemical methods

Natalija German, Asta Kausaite-Minkstimiene, Justina Kirlyte, Asta Makaraviciute, Arunas Ramanavicius, Lina Mikoliunaite and Almira Ramanaviciene\*

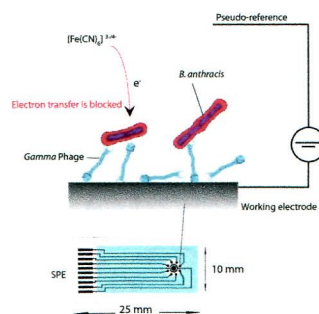
The highest sensitivities of developed immunosensors were achieved using pulse amperometry and cyclic voltammetry, while differential pulse and square wave voltammetries were less informative for direct label free detection of antibodies.

1434

### Carbon microarrays for the direct impedimetric detection of *Bacillus anthracis* using *Gamma* phages as probes

Arghavan Shabani, Christophe A. Marquette,\*  
Rosemonde Mandeville and Marcus F. Lawrence

A direct and efficient impedimetric method is presented for the detection of *Bacillus anthracis* Sterne vegetative cells, using *Gamma* phages as probes attached to screen-printed carbon electrode microarrays.

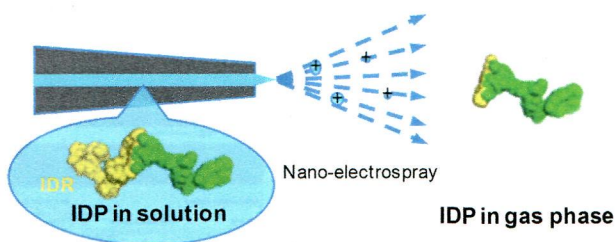


1441

### Characterisation of an intrinsically disordered protein complex of Swi5–Sfr1 by ion mobility mass spectrometry and small-angle X-ray scattering

Kazumi Saikusa, Naoyuki Kuwabara, Yuichi Kokabu,  
Yu Inoue, Mamoru Sato, Hiroshi Iwasaki,  
Toshiyuki Shimizu, Mitsunori Ikeguchi and Satoko Akashi\*

Extreme compaction of ID regions in the gas phase was experimentally identified by the combination of IM-MS and SAXS.

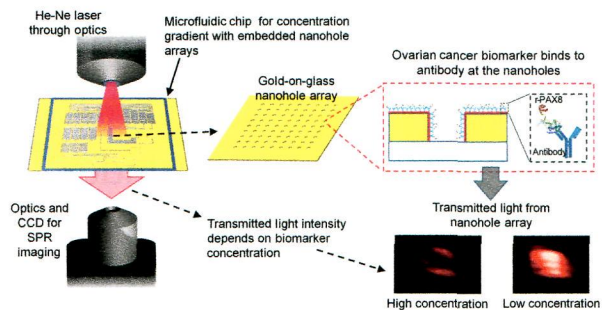


1450

### Quantification of ovarian cancer markers with integrated microfluidic concentration gradient and imaging nanohole surface plasmon resonance

Carlos Escobedo, Yu-Wei Chou, Mohammad Rahman,  
Xiaobo Duan, Reuven Gordon, David Sinton,  
Alexandre G. Brolo and Jacqueline Ferreira\*

Nanohole arrays are integrated into a microfluidic gradient generator for detection of ovarian cancer biomarkers via SPR imaging.

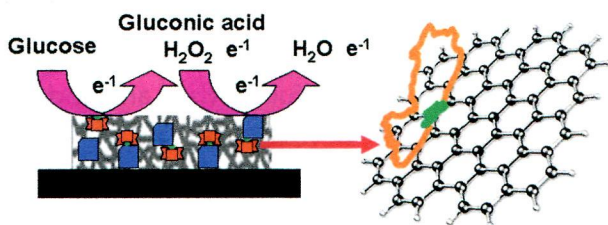


1459

### A novel platform for enhanced biosensing based on the synergy effects of electrospun polymer nanofibers and graphene oxides

Xiaofang Su, Jun Ren,\* Xianwei Meng,\* Xiangling Ren  
and Fangqiong Tang\*

The efficient biosensing of glucose was achieved via the synergy effects of graphene oxides and electrospun polymer nanofibers.

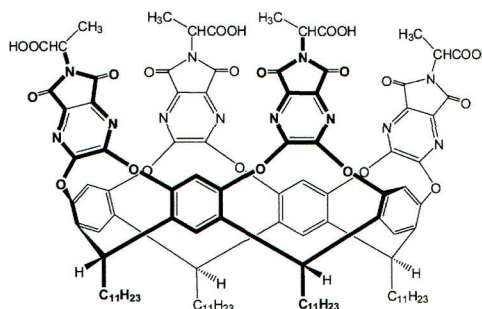


1467

### Transition metal cation separations with a resorcinarene-based amino acid stationary phase

Na Li, Lee J. Allen, Roger G. Harrison and John D. Lamb\*

A resorcinarene-based macrocyclic ligand functionalized with alanine and undecyl groups (AUA) was synthesized and applied to ion chromatographic separations.

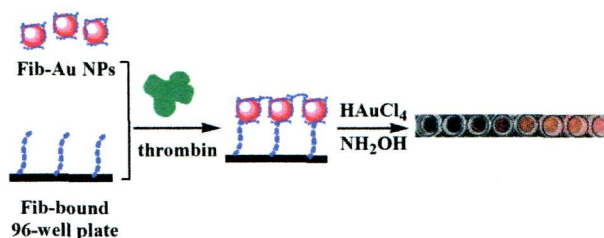


1475

### Turn-on colorimetric sensor for ultrasensitive detection of thrombin using fibrinogen-gold nanoparticle conjugate

Yajing Niu, Ping Wang, Yanjun Zhao and Aiping Fan\*

This study develops a simple, colorimetric 'turn on' sensor for ultrasensitive detection of thrombin.

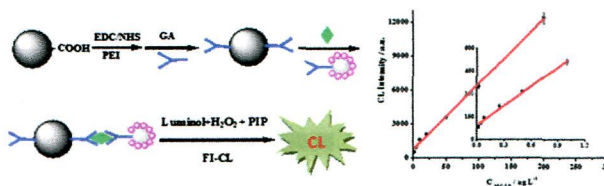


1483

### Flow injection chemiluminescence immunoassay of microcystin-LR by using PEI-modified magnetic beads as capturer and HRP-functionalized silica nanoparticles as signal amplifier

Jusheng Lu, Wei Wei, Lihong Yin, Yuepu Pu and Songqin Liu\*

A rapid sandwiched immunoassay of microcystin-LR in water is proposed with flow injection chemiluminescence detection.

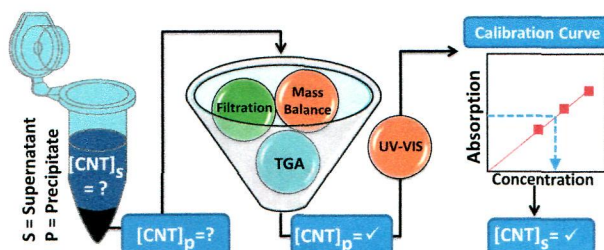


1490

### A simple solution for the determination of pristine carbon nanotube concentration

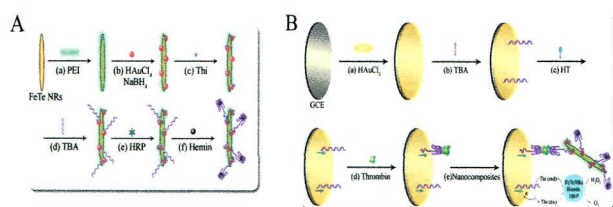
Michael Shtein, Ilan Pri-bar and Oren Regev\*

An accurate method for determining the carbon nanotube (CNT) concentration in the supernatant *via* precipitate analysis was developed, overcoming limitations in presently used techniques.





1497

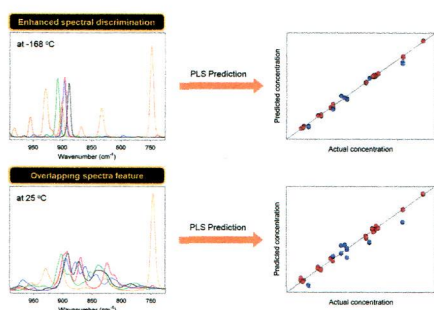


### An ultrasensitive electrochemical aptasensor for thrombin based on the triplex-amplification of hemin/G-quadruplex horseradish peroxidase-mimicking DNAzyme and horseradish peroxidase decorated FeTe nanorods

Liping Jiang, Ruo Yuan,\* Yaqin Chai, Yali Yuan, Lijuan Bai and Yan Wang

In the present study, we fabricated an ultrasensitive sandwich-type electrochemical aptasensor for thrombin (TB) based on a triplex signal amplification strategy.

1504

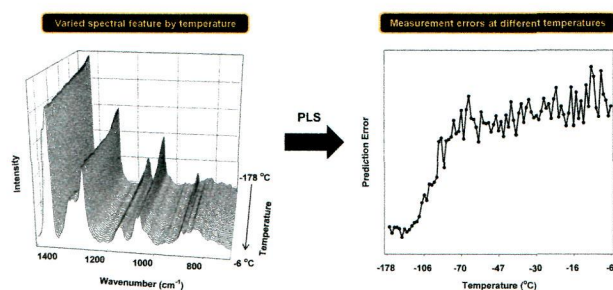


### Enhancement of the spectral selectivity of complex samples by measuring them in a frozen state at low temperatures in order to improve accuracy for quantitative analysis. Part I. Raman spectroscopic compositional analysis of synthetic hydrocarbon mixtures

Jinyoung Hwang and Hoeil Chung\*

Raman spectra collected at a frozen state provide improved spectral selectivity for compositional analysis.

1515

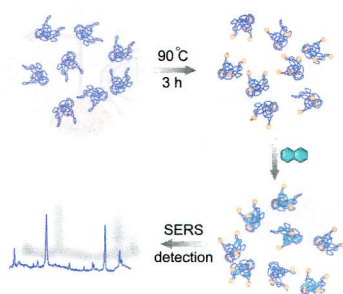


### Enhancement of the spectral selectivity of complex samples by measuring them in a frozen state at low temperatures in order to improve accuracy for quantitative analysis. Part II. Determination of viscosity for lube base oils using Raman spectroscopy

Mooeung Kim and Hoeil Chung\*

Raman spectra of lube base oils (LBOs) collected under frozen states provide improved accuracy for viscosity determination.

1523



### Humic acids-based one-step fabrication of SERS substrates for detection of polycyclic aromatic hydrocarbons

Lu-Lu Qu, Yuan-Ting Li, Da-Wei Li,\* Jin-Qun Xue, John S. Fossey and Yi-Tao Long\*

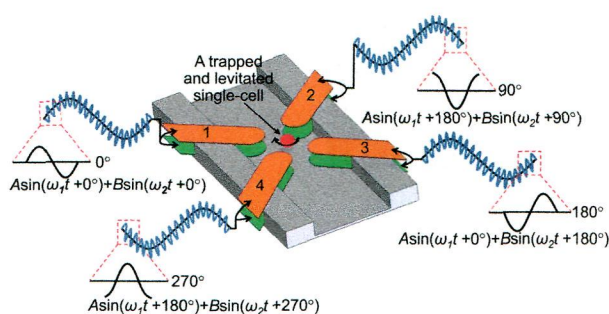
A facile one-step method to fabricate surface-enhanced Raman scattering substrates, Ag NPs-decorated with HAs, through reduction of silver nitrate with HAs for the direct detection of PAHs.

1529

### An electroration technique for measuring the dielectric properties of cells with simultaneous use of negative quadrupolar dielectrophoresis and electroration

Song-I Han, Young-Don Joo and Ki-Ho Han\*

This paper introduces an electroration technique, which can simultaneously trap, levitate, and rotate a single-cell by using only electrical signals.

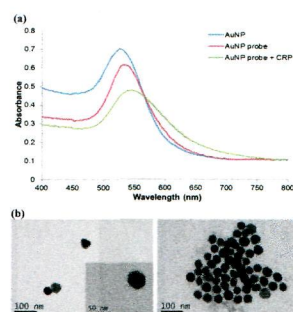


1538

### A colorimetric homogeneous immunoassay system for the C-reactive protein

Ju-Young Byun, Yong-Beom Shin, Dong-Myung Kim and Min-Gon Kim\*

The C-reactive protein (CRP), which has a five repeat pentameric structure, is known to be a marker for acute inflammation and a potential risk predictor for cardiovascular disease.

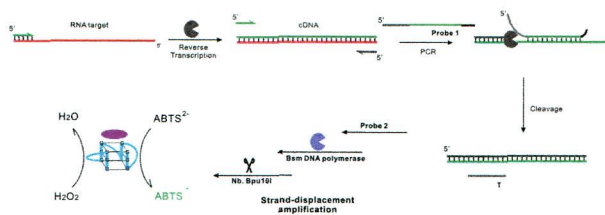


1544

### RNA pathogen detection with one-step reverse transcription PCR and strand-displacement based signal amplification

Feng Du, Frank Streckenbach, Haodong Chen, Xin Huang, Zhuo Tang\* and Andreas Marx\*

A novel detection method for RNA pathogens based on one-step reverse transcription PCR and strand-displacement based signal amplification.

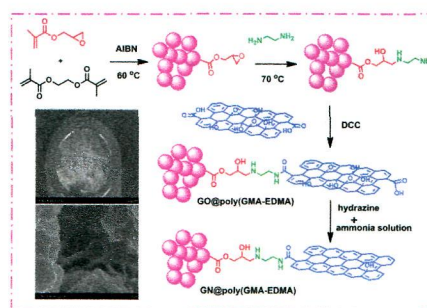


1549

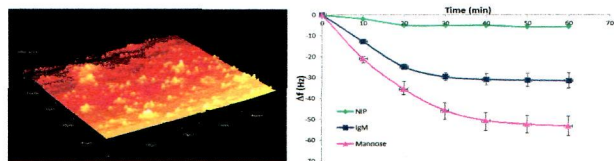
### A strategy to decorate porous polymer monoliths with graphene oxide and graphene nanosheets

Shanshan Tong, Xiao Zhou, Caihong Zhou, Yuanyuan Li, Wanjun Li, Weihong Zhou and Qiong Jia\*

New type of graphene oxide/graphene nanosheets-decorated poly(glycidyl methacrylate-ethylene dimethacrylate) monoliths were designed and synthesized via a chemical bonding method.



1558

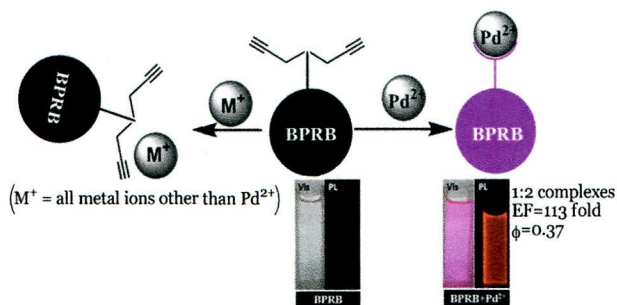


### New synthesis method for 4-MAPBA monomer and using for the recognition of IgM and mannose with MIP-based QCM sensors

Sibel Emir Diltemiz, Deniz Hür, Rüstem Keçili, Arzu Ersöz and Rıdvan Say\*

Quartz crystal microbalance (QCM) sensors coated with molecularly imprinted polymers (MIP) have been developed for the recognition of immunoglobulin M (IgM) and mannose.

1564

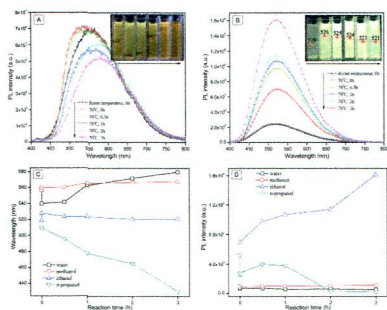


### A depropargylation-triggered fluorescence “turn-on” probe for the detection of Pd<sup>2+</sup> based on a bispropargylamine–rhodamine conjugate

Rathinam Balamurugan, Chih-Chieh Chien, Kai-Ming Wu, Yi-Hong Chiu and Jui-Hsiang Liu\*

A bis-propargyl-appended-rhodamine B-based receptor **BPRB** has been synthesized that exhibits pronounced fluorescence enhancement in the presence of Pd<sup>2+</sup> ions over a range of other metal ions.

1570

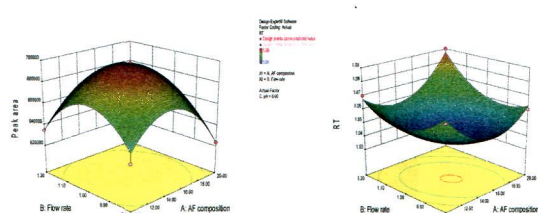


### Comparative study on CdSe QDs synthesized from water and ethanol: Hydrogen bond induced particle agglomeration and enhancement on photoluminescence

Weiguo Tian, Wen Mi, Jintao Tian,\* Jinqian Jia, Xiaoyun Liu, Zhibin Zhu, Jinhui Dai and Xin Wang

In this paper a comparative study is carried out on the CdSe QDs synthesized from water and ethanol.

1581



### Development and validation of LC–MS/MS method for the quantitation of lenalidomide in human plasma using Box–Behnken experimental design

M. Saquib Hasnain,\* Shireen Rao, Manoj Kr Singh, Nitin Vig, Amit Gupta, Abdulla Ansari, Pradeep Sen, Pankaj Joshi and Shaukat Ali Ansari

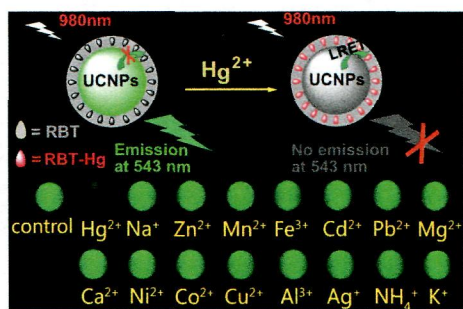
Ultra-fast stability indicating LC–MS/MS method for the determination of lenalidomide using carbamazepine.

1589

### NaYF<sub>4</sub>:Yb<sup>3+</sup>/Er<sup>3+</sup> nanoparticle-based upconversion luminescence resonance energy transfer sensor for mercury(II) quantification

Hui Li and Leyu Wang\*

An ultrasensitive, selective, label free, and rapid upconversion (UC) luminescence resonance energy transfer (LRET) sensor based on the Rhodamine B thiolactone (RBT) functionalized NaYF<sub>4</sub>:15%Yb<sup>3+</sup>,5%Er<sup>3+</sup> (UCNPs@RBT) nanocomposites has been developed for rapid detection of mercury ion (Hg<sup>2+</sup>) down to 5 nM in water.

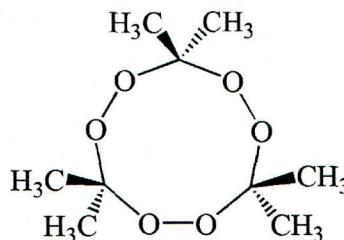


1596

### A novel microarray chemiluminescence method based on chromium oxide nanoparticles catalysis for indirect determination of the explosive triacetone triperoxide at the scene

Xiaohua Li, Zhujun Zhang\* and Liang Tao

Chromium oxide (Cr<sub>2</sub>O<sub>3</sub>) nanoparticles were found to greatly enhance the chemiluminescence (CL) of the luminol-hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) system.



## Faraday Discussion 164

# Electroanalysis at the Nanoscale

1-3 July 2013, Durham University, UK

### Themes

- Charge transfer at the nanoscale
- Nanomaterial platforms
- Chemical detection
- Bioelectrolysis via nanomaterials

07222