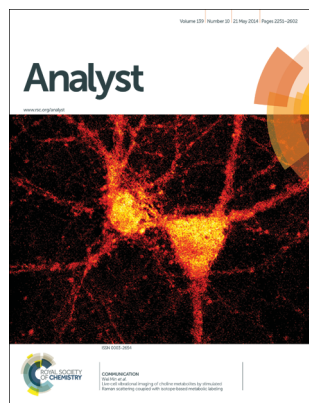


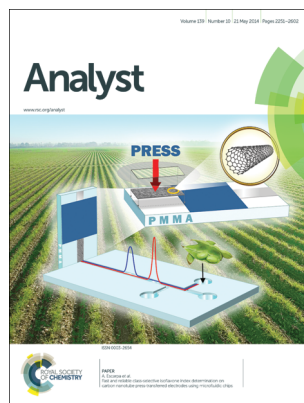
## IN THIS ISSUE

ISSN 0003-2654 CODEN ANALAO 139(10) 2251–2602 (2014)



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See Wei Min et al., pp. 2312–2317.  
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### Inside cover

See A. Escarpa et al., pp. 2342–2347.  
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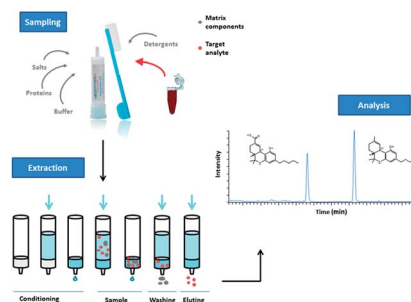
## MINIREVIEW

2265

### Recent advances in sample preparation techniques to overcome difficulties encountered during quantitative analysis of small molecules from biofluids using LC-MS/MS

Caroline Bylda, Roland Thiele, Uwe Kobold and Dietrich A. Volmer\*

This review describes common problems encountered during sample preparation, ways to optimize established sample preparation techniques and important recent developments.



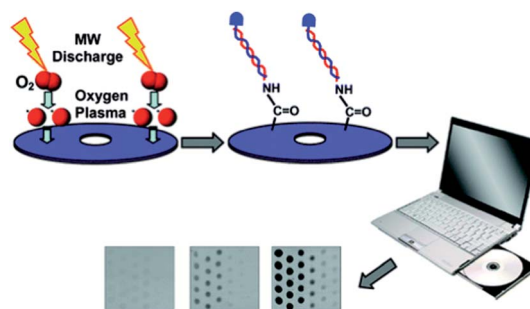
## CRITICAL REVIEW

2277

### Emerging technologies for biomedical analysis

Christine F. Woolley\* and Mark A. Hayes

Emerging technologies for biomedical analysis is a critical review of recent representative publications aimed at improving medical diagnostic capabilities.



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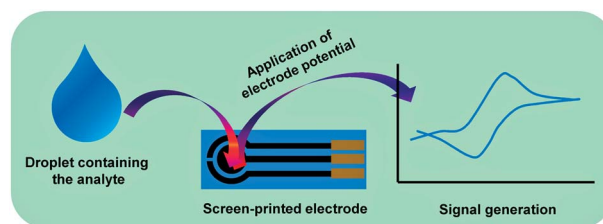
## TUTORIAL REVIEW

2289

**A review on amperometric-type immunosensors based on screen-printed electrodes**

Kalyan Kumar Mistry,\* Keya Layek, Abhijit Mahapatra, Chirasree RoyChaudhuri and Hiranmay Saha

This review deals with the recent research activities involved in the development of amperometric-type immunosensors based on screen-printed electrodes.



## COMMUNICATIONS

2312

**Live-cell vibrational imaging of choline metabolites by stimulated Raman scattering coupled with isotope-based metabolic labeling**

Fanghao Hu, Lu Wei, Chaogu Zheng, Yihui Shen and Wei Min\*

High-resolution imaging of choline metabolites in living mammalian cells, primary neurons and *C. elegans* has been demonstrated with the potential for *in vivo* disease detection and developmental monitoring.

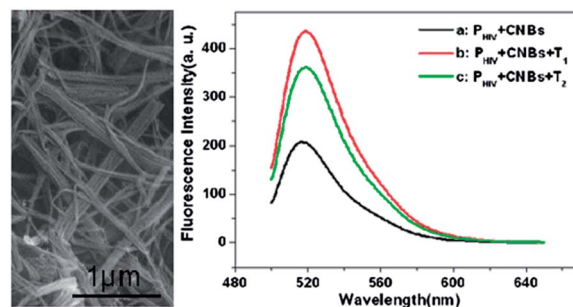


2318

**Carbon nanobelts as a novel sensing platform for fluorescence-enhanced DNA detection**

Xuping Sun,\* Zhicai Xing, Rui Ning, Abdullah M. Asiri and Abdullah Y. Obaid

Carbon nanobelts (CNBs), obtained via pyrolysis of a 1,8-diaminonaphthalene–NiCl<sub>2</sub>·6H<sub>2</sub>O mixture under Ar followed by acid leaching, can serve as a novel effective sensing platform for fluorescence-enhanced DNA detection.

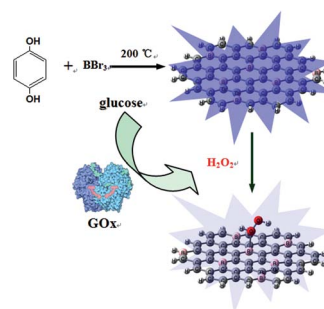


2322

**B-doped carbon quantum dots as a sensitive fluorescence probe for hydrogen peroxide and glucose detection**

Xiaoyue Shan, Lujing Chai, Juanjuan Ma, Zhaosheng Qian, Jianrong Chen and Hui Feng\*

Fluorescent B-doped carbon quantum dots (BCQDs) were used as a novel fluorescence sensing system for hydrogen peroxide and glucose detection.



## COMMUNICATIONS

2326

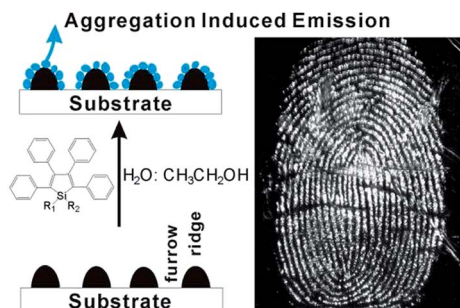


### Vapor-phase deposition of polymers as a simple and versatile technique to generate paper-based microfluidic platforms for bioassay applications

Gokhan Demirel\* and Esra Babur

A simple yet versatile approach has been demonstrated for the fabrication of paper-based microfluidic platforms based on a vapor-phase polymerization technique.

2332

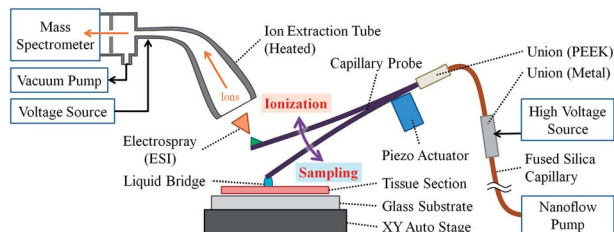


### Enhancing the visualization of latent fingerprints by aggregation induced emission of siloles

Linru Xu, Yan Li, Shuhong Li, Rongrong Hu, Anjun Qin,\* Ben Zhong Tang\* and Bin Su\*

Aggregation-induced emission was explored for the visual enhancement of latent fingerprints deposited on wet non-porous surfaces.

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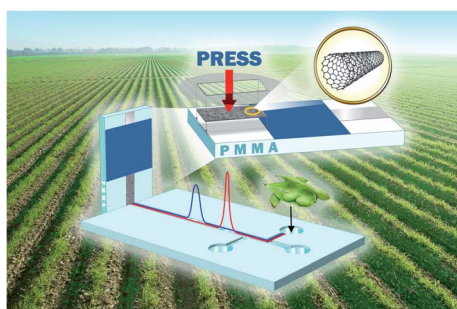
### Imaging mass spectrometry of a mouse brain by tapping-mode scanning probe electro-spray ionization

Yoichi Otsuka,\* Junpei Naito, Shuya Satoh, Masafumi Kyogaku, Hiroyuki Hashimoto and Ryuichi Arakawa

Methods for ambient sampling and ionization enable chemical information to be obtained with minimal sample preparation.

## PAPERS

2342



### Fast and reliable class-selective isoflavone index determination on carbon nanotube press-transferred electrodes using microfluidic chips

D. Vilela, A. Martín, M. C. González and A. Escarpa\*

Direct microfluidic electrochemical sensing of class-isoflavones in complex soy samples on press-transferred carbon nanotubes.



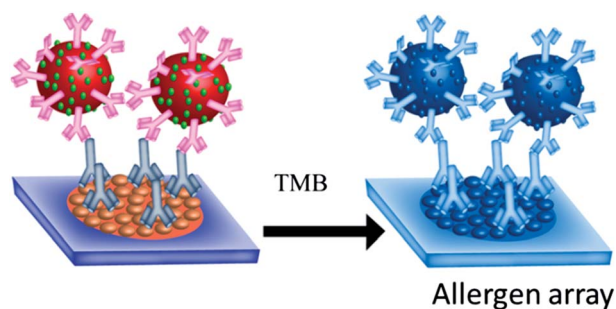
## PAPERS

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### A lateral flow paper microarray for rapid allergy point of care diagnostics

Thiruppathiraja Chinnasamy, Loes I. Segerink, Mats Nystrand, Jesper Gantelius and Helene Andersson Svahn\*

Rapid dual labelled gold nanoparticle based paper allergen microarray assay for allergy sensitization profiling in clinical samples.

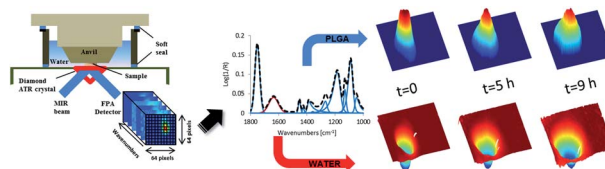


2355

### The application of non-linear curve fitting routines to the analysis of mid-infrared images obtained from single polymeric microparticles

Hakan Keles, Andrew Naylor, Francis Clegg and Chris Sammon\*

For the first time, we report a series of time resolved images of a single PLGA microparticle undergoing hydrolysis at 70 °C that have been obtained using attenuated total reflectance-Fourier transform infrared spectroscopic (ATR-FTIR) imaging.

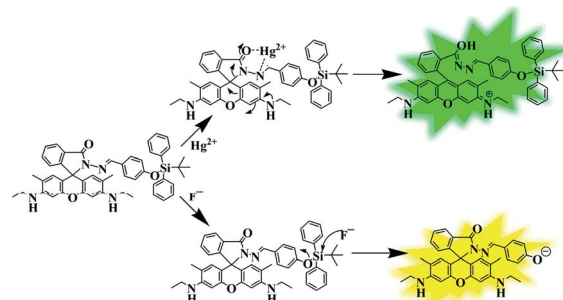


2370

### Rhodamine based dual probes for selective detection of mercury and fluoride ions in water using two mutually independent sensing pathways

Namita Kumari, Nilanjan Dey and Santanu Bhattacharya\*

A single rhodamine probe has been utilized for detection of two ions,  $\text{Hg}^{2+}$  and  $\text{F}^-$ , using two mutually independent sensing pathways.

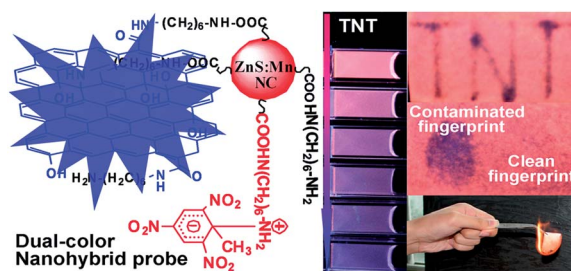


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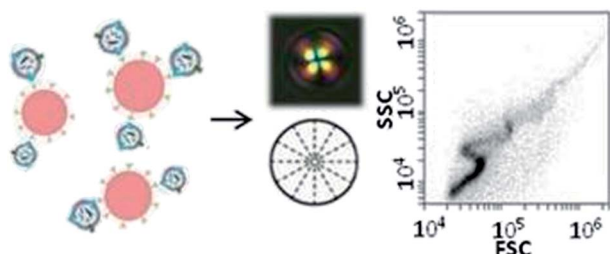
### Selective visual detection of trace trinitrotoluene residues based on dual-color fluorescence of graphene oxide–nanocrystals hybrid probe

Kui Zhang, Lei Yang, Houjuan Zhu, Fang Ma, Zhongping Zhang and Suhua Wang\*

The dual-color fluorescence nanohybrid probe comprising blue emissive fluorescent graphene oxide and red emissive nanocrystals has been developed for the visual detection of TNT residues in solution and on various surfaces.



2386

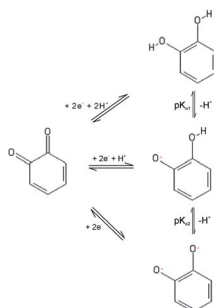


### Liquid crystal droplet-based amplification of microvesicles that are shed by mammalian cells

Lie Na Tan, Gregory J. Wiepz, Daniel S. Miller, Eric V. Shusta and Nicholas L. Abbott\*

Microvesicles shed by cells are captured by binding targeted proteins and optically amplified using liquid crystal microdroplets and flow cytometry.

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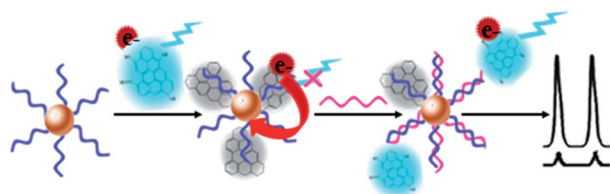


### Voltammetric pH sensor based on an edge plane pyrolytic graphite electrode

Min Lu and Richard G. Compton\*

A simple sensor for pH determination is reported using *unmodified* edge plane pyrolytic graphite (EPPG) electrodes.

2404

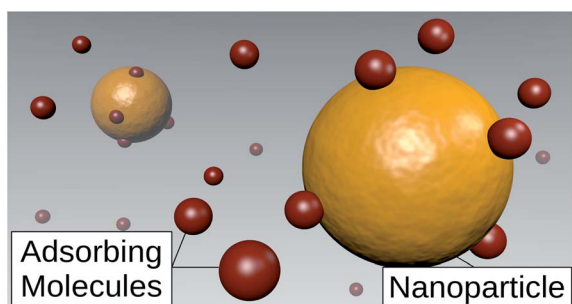


### Electrochemiluminescence resonance energy transfer between graphene quantum dots and gold nanoparticles for DNA damage detection

Qian Lu, Wei Wei, Zhenxian Zhou, Zhixin Zhou, Yuanjian Zhang and Songqin Liu\*

Electrochemiluminescence resonance energy transfer between graphene quantum dots (GQDs) and Au nanoparticles results in the electrochemiluminescence signal of the GQDs being quenched or recovering.

2411



### Nanoparticles in sensing applications: on what timescale do analyte species adsorb on the particle surface?

Enno Kätelhön and Richard G. Compton\*

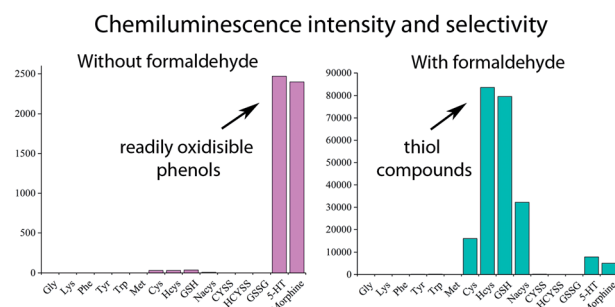
We introduce an analytical model for analyte adsorption on nanoparticles and calculate the fractional surface coverage and the total number of adsorbed molecules as a function of time.

2416

### Enhancing permanganate chemiluminescence detection for the determination of glutathione and glutathione disulfide in biological matrices

Zoe M. Smith, Jessica M. Terry, Neil W. Barnett, Laura J. Gray, Dean J. Wright and Paul S. Francis\*

Formaldehyde has a dramatic enhancing effect on not only the sensitivity but also the selectivity of permanganate chemiluminescence detection towards thiol compounds, including glutathione – an important biomarker of oxidative stress.

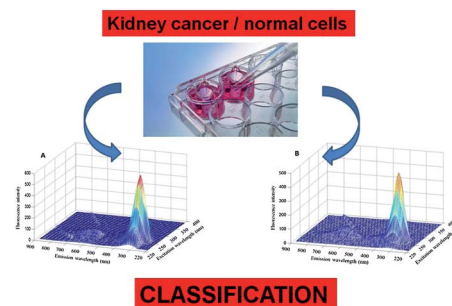


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### The use of EEM fluorescence data and OPLS/UPLS-DA algorithm to discriminate between normal and cancer cell lines: a feasibility study

Ana Carolina de Oliveira Neves, Raimundo Fernandes de Araújo Júnior, Ana Luiza Cabral de Sá Leitão Oliveira, Aurigena Antunes de Araújo and Kássio Michell Gomes de Lima\*

EEM fluorescence spectroscopy combined with the OPLS method has been investigated as a tool to discriminate between normal and cancer cell lines.

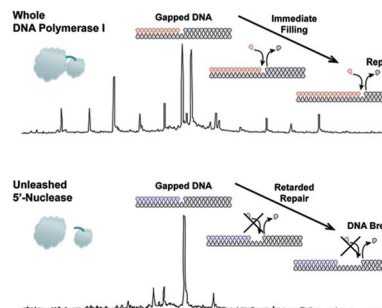


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### Mass spectrometric investigation of the role of the linking polypeptide chain in DNA polymerase I

TaeHo Yeom, Jungyoon Lee, Seonghyun Lee, Sunah Kang, Kyung Rok Kim, Byungwoo Han, Hyun Soo Lee and Kyubong Jo\*

MALDI-TOF analysis elucidates the functions of two domains in pol I.

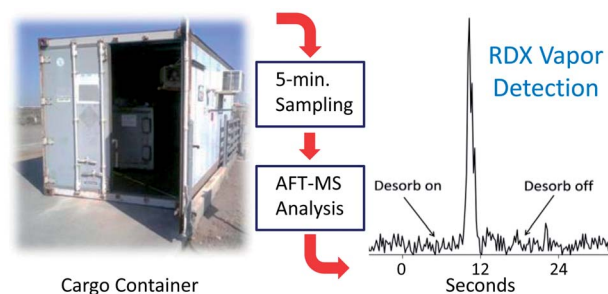


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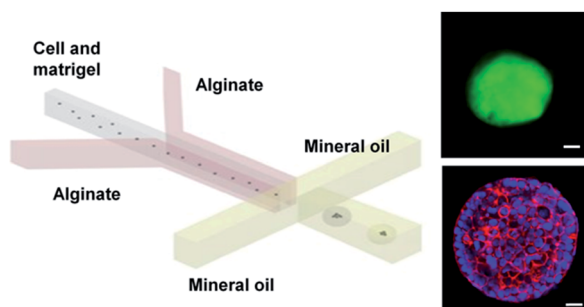
### Optimizing detection of RDX vapors using designed experiments for remote sensing

Robert G. Ewing,\* Alejandro Heredia-Langner and Marvin G. Warner

Detection of RDX vapors from a shipping container using rapid sampling and desorption into an atmospheric flow tube mass spectrometer.



2449

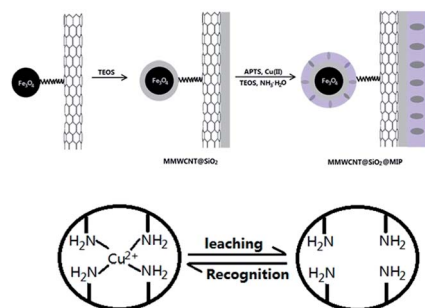


### Mixed hydrogel bead-based tumor spheroid formation and anticancer drug testing

Yaolei Wang and Jinyi Wang\*

A microfluidic method was developed for the formation of tumor spheroids using alginate and matrigel mixed hydrogel beads.

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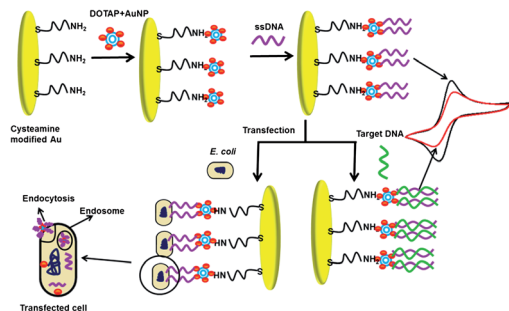


### Preparation of a core-shell magnetic ion-imprinted polymer via a sol-gel process for selective extraction of Cu(II) from herbal medicines

Huan He, Deli Xiao, Jia He, Hui Li,\* Hua He,\* Hao Dai and Jun Peng

A magnetic surface ion-imprinted polymer (c-MMWCNTs-SiO<sub>2</sub>-IIP) was synthesized using c-MMWCNTs as the core, 3-ammonium propyltriethoxysilane (APTES) as the functional monomer, tetraethylorthosilicate (TEOS) as the cross-linker and Cu(II) as the template.

2467

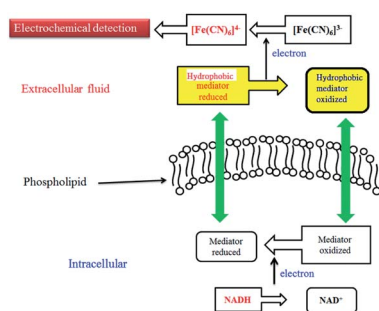


### Tethering of spherical DOTAP liposome gold nanoparticles on cysteamine monolayer for sensitive label free electrochemical detection of DNA and transfection

Mohanlal Bhuvana and Venkataraman Dharuman\*

Cysteamine monolayer supported spherical DOTAP-AuNP on gold electrode is developed for DNA label free sensing and transfection.

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### Electrochemical sensing of hepatocyte viability

Hweiyen Tsai,\* Shang-heng Tsai, Wei-Jen Ting, Chao-Chin Hu and C. Bor Fuh\*

Chronoamperometry using ferricyanide and succinate mediators is an efficient analytical tool for assessing the viability of primary hepatocytes.

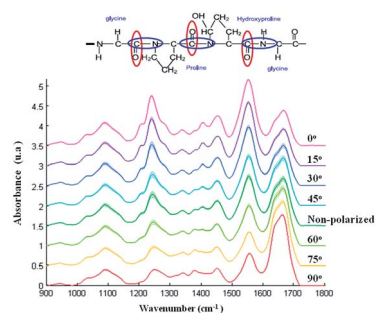


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## Changes of skin collagen orientation associated with chronological aging as probed by polarized-FTIR micro-imaging

The Thuong Nguyen, Christophe Eklouh-Molinier, David Sebiskveradze, Jezabel Feru, Christine Terryn, Michel Manfait, Sylvie Brassart-Pasco and Olivier Piot\*

High sensitivity of the amide bands with the polarization of the IR light.



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## Macroscopic Fourier transform infrared scanning in reflection mode (MA-rFTIR), a new tool for chemical imaging of cultural heritage artefacts in the mid-infrared range

Stijn Legrand,\* Matthias Alfeld, Frederik Vanmeert, Wout De Nolf and Koen Janssens\*

Macroscopic Fourier transform infrared scanning in reflection mode (MA-rFTIR), a new tool for the chemical imaging of cultural heritage artefacts in the extended mid-infrared range (7500–375 cm<sup>-1</sup>).

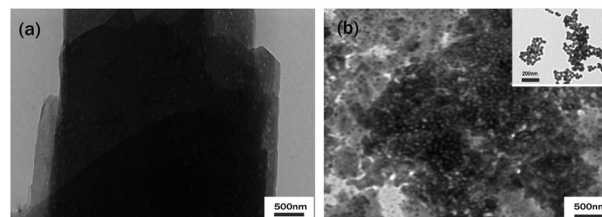


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## A novel strategy for real-time and *in situ* detection of cytochrome c and caspase-9 in Hela cells during apoptosis

Qingqing Wen, Xi Zhang, Jiye Cai and Pei-Hui Yang\*

Cytochrome c (cyt c) and caspase-9 were critical biomarkers in mitochondria-mediated apoptosis.

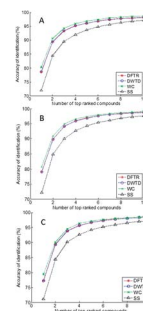


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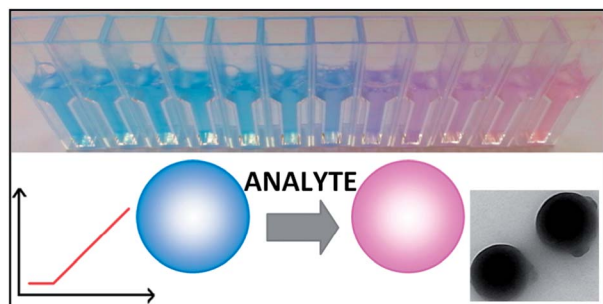
## Compound identification in GC-MS by simultaneously evaluating the mass spectrum and retention index

Xiaoli Wei, Imhoi Koo, Seongho Kim and Xiang Zhang\*

We report a compound identification method (SimMR), which simultaneously evaluates the mass spectrum similarity and the retention index distance using an empirical mixture score function, for the analysis of GC-MS data.



2515

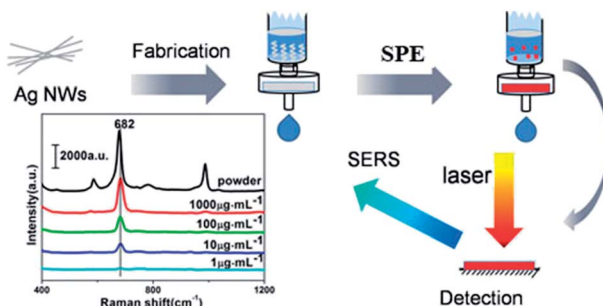


### Alternating polymer micelle nanospheres for optical sensing

Anna Kisiel, Katarzyna Kłucińska, Zuzanna Głębicka, Marianna Gniadek, Krzysztof Maksymiuk and Agata Michalska\*

A novel concept of nanosized fluorimetric sensors is proposed, using alternating polymers as self assembling micelles that can be crosslinked resulting in stable polymeric nanoparticles.

2525

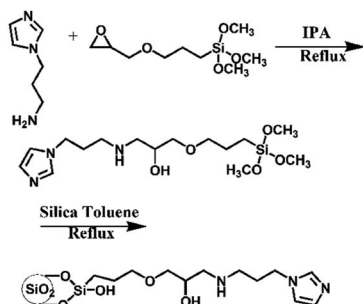


### A disordered silver nanowires membrane for extraction and surface-enhanced Raman spectroscopy detection

Yu-e Shi, Limei Li, Min Yang, Xiaohong Jiang, Quanqin Zhao and Jinhua Zhan\*

A disordered silver nanowires membrane combining solid-phase extraction with surface-enhanced Raman spectroscopy was used for the rapid collection and detection of food contaminants.

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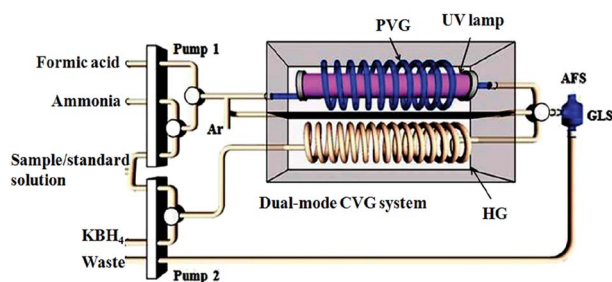


### Preparation of an aminopropyl imidazole-modified silica gel as a sorbent for solid-phase extraction of carboxylic acid compounds and polycyclic aromatic hydrocarbons

Na Wang, Yong Guo, Licheng Wang, Xiaojing Liang, Shujuan Liu\* and Shengxiang Jiang\*

An aminopropyl imidazole-modified silica sorbent was synthesized and characterized for extraction of carboxylic acid compounds and polycyclic aromatic hydrocarbons.

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### Dual-mode chemical vapor generation for simultaneous determination of hydride-forming and non-hydride-forming elements by atomic fluorescence spectrometry

Yu Wang, Kailai Xu, Xiaoming Jiang, Xiandeng Hou and Chengbin Zheng\*

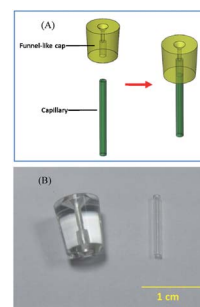
A dual-mode chemical vapor generation system was developed for simultaneous multi-element analysis of hydride-forming and non-hydride-forming elements.

2545

### A new strategy for highly efficient single-drop microextraction with a liquid–gas compound pendant drop

Hai-Yang Xie, Jian Yan, Sharmin Jahan, Ran Zhong, Liu-Yin Fan, Hua Xiao, Xin-Qiao Jin and Cheng-Xi Cao\*

Herein, a simple assembly was designed via a capillary and a funnel-like cap to achieve liquid–gas compound pendant drop (CPD) microextraction with great convenience.

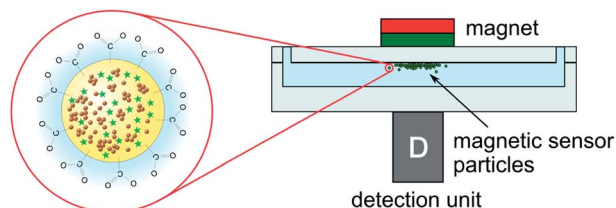


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### Magnetic optical sensor particles: a flexible analytical tool for microfluidic devices

Birgit Ungerböck, Siegfried Fellinger, Philipp Sulzer, Tobias Abel and Torsten Mayr\*

Magnetic optical sensor particles are used to generate *in situ* sensor spots within microfluidic channels and serve as flexible analytical tools.

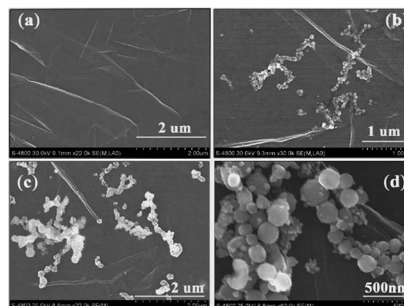


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### Direct growth of Pt@Ag nanochains on tailorable graphene oxide with a green, *in situ*, template-free method and its biosensing application

Ying Zhuo, Yan Wang, Ruo Yuan,\* Yaqin Chai,\* Yali Yuan, Lijuan Bai and Ling Zhang

In this work, we have investigated the *in situ* growth of Ag nanochains (AgNCs) on carboxyl-functionalized graphene oxide based on enzymatic metalization for the first time.

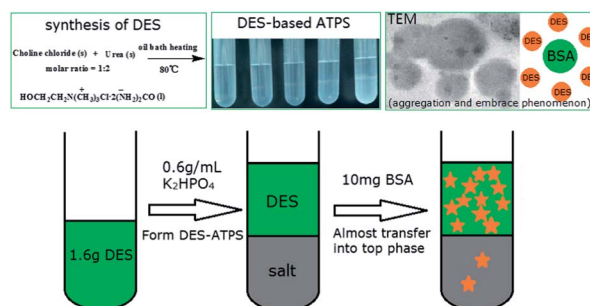


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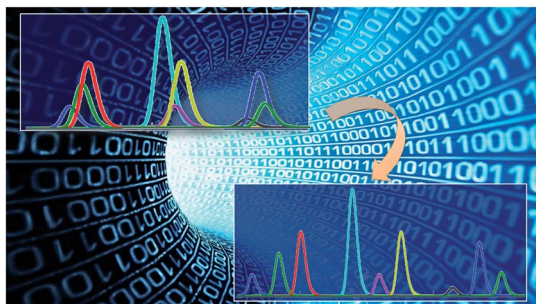
### Deep eutectic solvents as novel extraction media for protein partitioning

Qun Zeng, Yuzhi Wang,\* Yanhua Huang, Xueqin Ding, Jing Chen and Kaijia Xu

A strategy for protein purification with a deep eutectic solvent-based aqueous two-phase system. A choline chloride–urea DES was selected as the extraction solvent and bovine serum albumin was used as the analyte. The cluster phenomenon was evaluated. The deep eutectic solvent-based aqueous two-phase system is a potential alternative for the separation of template proteins.



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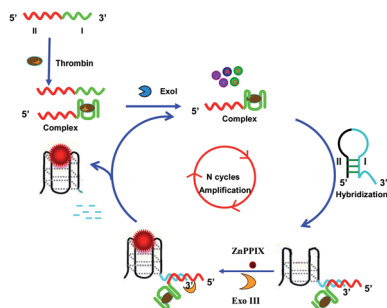


### Mutual information concept for evaluation of separation quality in hyphenated chromatographic measurements

Hadi Parastar\*

A new method for the evaluation of separation quality in hyphenated chromatographic measurements based on the information-theoretic concept of mutual information (MI) is developed.

2583

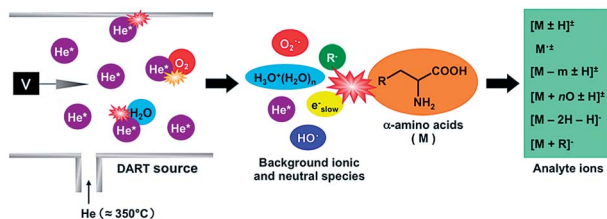


### A label-free fluorescence assay for thrombin based on aptamer exonuclease protection and exonuclease III-assisted recycling amplification-responsive cascade zinc(II)-protoporphyrin IX/G-quadruplex supramolecular fluorescent labels

Yanqin Lv, Qingwang Xue,\* Xiaohong Gu, Shuqiu Zhang and Jifeng Liu\*

A label-free and sensitive fluorescence protein assay was developed on the basis of aptamer exonuclease protection and exonuclease III-assisted recycling amplification.

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### Ionization characteristics of amino acids in direct analysis in real time mass spectrometry

Kanakano Sekimoto,\* Motoshi Sakakura, Takatomo Kawamukai, Hiroshi Hike, Teruhisa Shiota, Fumihiko Usui, Yasuhiko Bando and Mitsuo Takayama

Analytes used in DART mass spectrometry can be oxidized by hydrogen radicals  $\text{HO}^\bullet$  via oxygen attachment and hydrogen loss.