Volume 139 Number 19 7 October 2014 Pages 4719–5036

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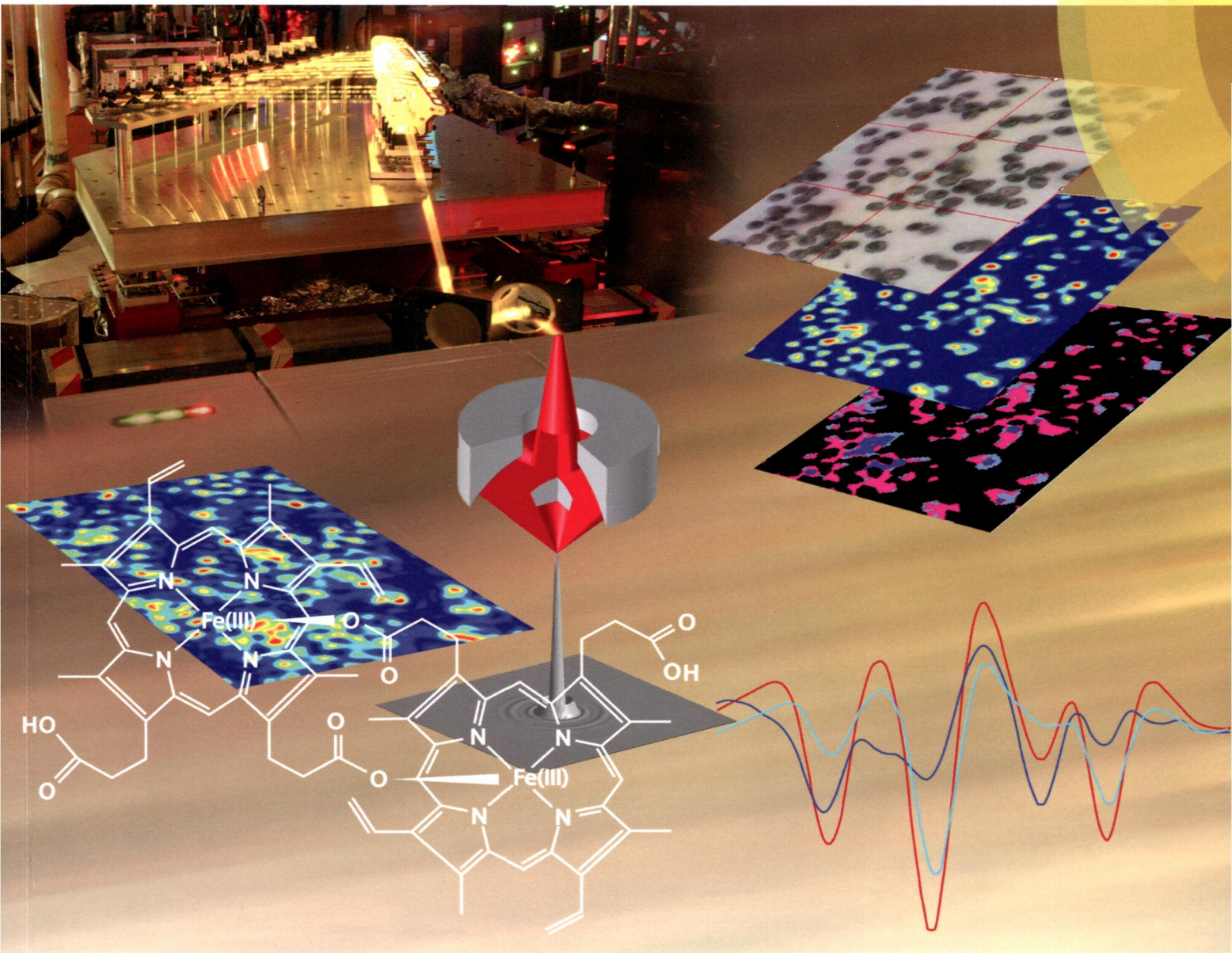

ISSN 0003-2654

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COMMUNICATION

Bayden R. Wood, Carol J. Hirschmugl *et al.*

Diagnosing malaria infected cells at the single cell level using focal plane array Fourier transform infrared imaging spectroscopy

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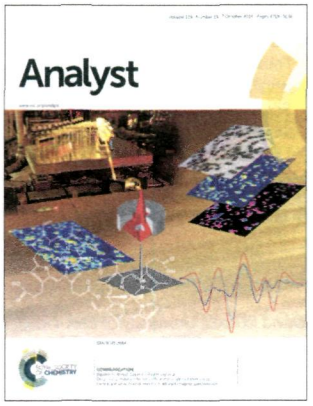
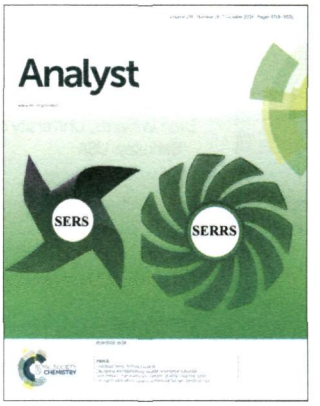
IN THIS ISSUE

ISSN 0003-2654 CODEN ANALAO 139(19) 4719–5036 (2014)



Cover
See Bayden R. Wood, Carol J. Hirschmugl *et al.*, pp. 4769–4774.
Image reproduced by permission of Bayden R. Wood from *Analyst*, 2014, **139**, 4769.



Inside cover
See Liangbao Yang, Jinhuai Liu *et al.*, pp. 4799–4805.
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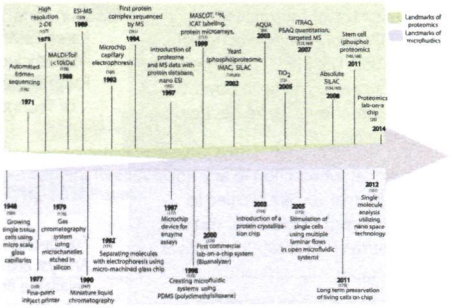
CRITICAL REVIEWS

4733

Towards single-cell LC-MS phosphoproteomics

A. N. Polat* and N. Özlü*

Protein phosphorylation is a ubiquitous posttranslational modification, which is heavily involved in signal transduction.

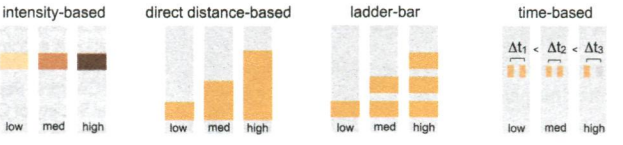


4750

Enabling robust quantitative readout in an equipment-free model of device development

Elain Fu*

This critical review focuses on work to enable bioassays with visible quantitative readout in a fully-disposable device.

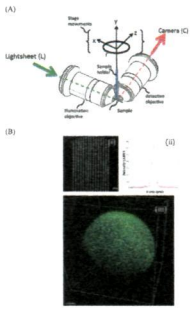


4758

Light sheet fluorescence microscopy (LSFM): past, present and future

John Lim, Hwee Kuan Lee, Weimiao Yu and Sohail Ahmed*

Light sheet fluorescence microscopy (LSFM) has emerged as an important imaging modality to follow biology in live 3D samples over time with reduced phototoxicity and photobleaching.

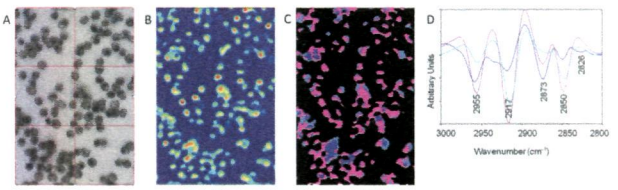


4769

Diagnosing malaria infected cells at the single cell level using focal plane array Fourier transform infrared imaging spectroscopy

Bayden R. Wood,* Keith. R. Bambery, Matthew W. A. Dixon, Leann Tilley, Michael J. Nasse, Eric Mattson and Carol J. Hirschmugl*

FTIR focal plane array imaging can be applied to diagnose single malaria infected cells in a thick film blood smear.

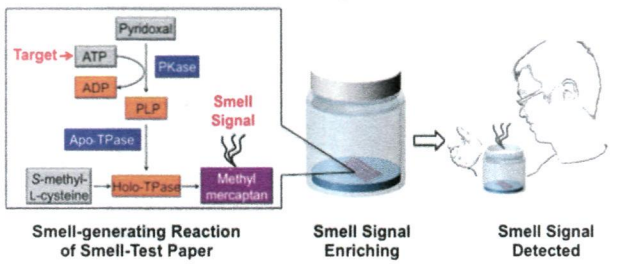


4775

An inkjet-printed bioactive paper sensor that reports ATP through odour generation

Zhuyuan Zhang, Jingyun Wang, Robin Ng, Yingfu Li, Zaisheng Wu, Vincent Leung, Spencer Imbrogno, Robert Pelton, John D. Brennan and Carlos D. M. Filipe*

An inkjet printed enzymatic paper-based sensor that reports ATP by generating an odour easily detectable by the human nose.

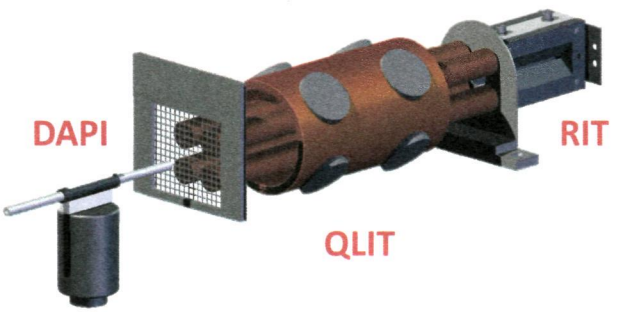


4779

High efficiency tandem mass spectrometry analysis using dual linear ion traps

Linfan Li, Xiaoyu Zhou, James W. Hager and Zheng Ouyang*

Dual LIT mass spectrometry for high efficiency MS/MS analysis.



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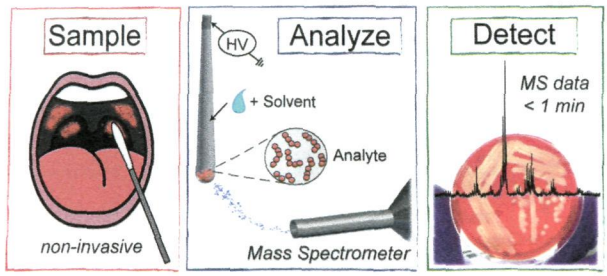
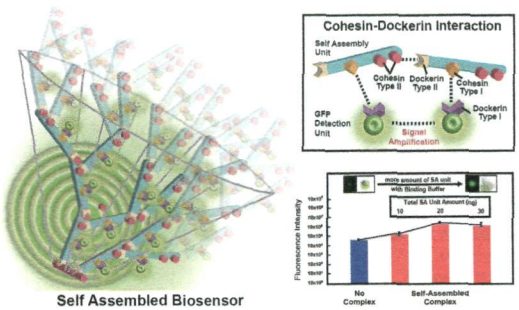


Detection of strep throat causing bacterium directly from medical swabs by touch spray-mass spectrometry

Alan K. Jarmusch, Valentina Pirro, Kevin S. Kerian and R. Graham Cooks*

The underlying science and initial stages of development of a non-invasive diagnostic technique for strep throat based on ambient ionization mass spectrometry are detailed.

4790

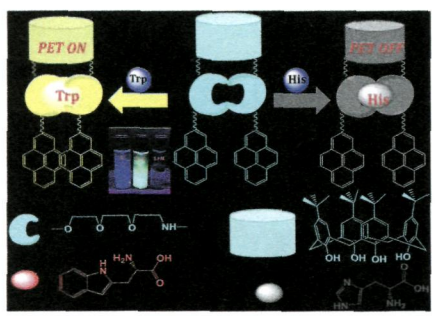


Signal amplification by a self-assembled biosensor system designed on the principle of dockerin–cohesin interactions in a cellulosome complex

Jeong Eun Hyeon, Dae Hee Kang and Sung Ok Han*

A self-assembled protein complex based on the principle of a cellulosome system is proposed for a biosensor with high sensitivity due to signal amplification.

4794

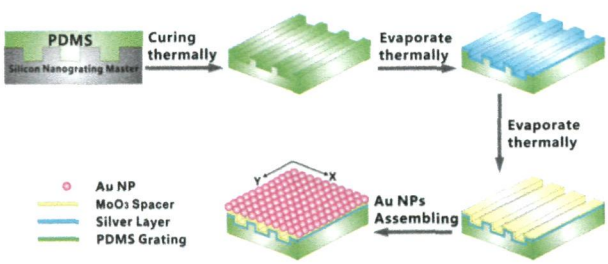


A unique fluorescence biosensor for selective detection of tryptophan and histidine

Pinkesh G. Sutariya, Alok Pandya, Anand Lodha and Shobhana K. Menon*

A novel photoinduced electron transfer (PET) based substituted calix[4]arene fluoroionophore has been used for the selective recognition of tryptophan (L-Trp) and histidine (L-His) by emission spectra.

4799



Designing and fabricating double resonance substrate with metallic nanoparticles–metallic grating coupling system for highly intensified surface-enhanced Raman spectroscopy

Ying Zhou, Xuanhua Li, Xingang Ren, Liangbao Yang* and Jinhuai Liu*

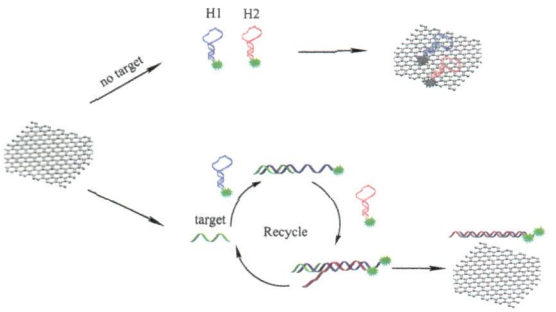
We propose and fabricate a novel double-resonance SERS system by strategically assembling Au NPs separated by a MoO_3 nanospacer from an Ag grating film.

4806

A graphene oxide-based enzyme-free signal amplification platform for homogeneous DNA detection

Zhen Zhang, Yufei Liu, Xinghu Ji,* Xia Xiang and Zhike He*

An enzyme-free sensor based on graphene oxide (GO) and target-catalyzed hairpin assembly is developed for homogeneous DNA detection.

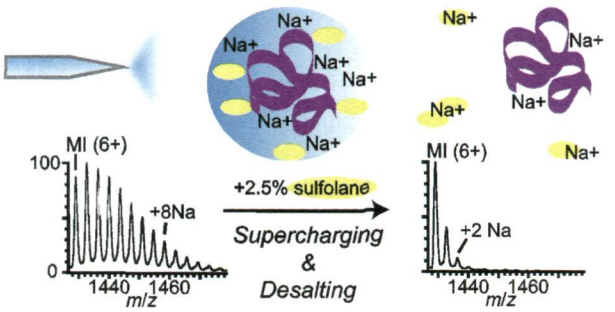


4810

Desalting protein ions in native mass spectrometry using supercharging reagents

Catherine A. Cassou and Evan R. Williams*

Low concentrations of supercharging reagents *m*-NBA (1.5%) and sulfolane (2.5%) effectively desalt protein ions produced by electrospray ionization from aqueous solutions, improving mass measuring accuracy for large proteins.

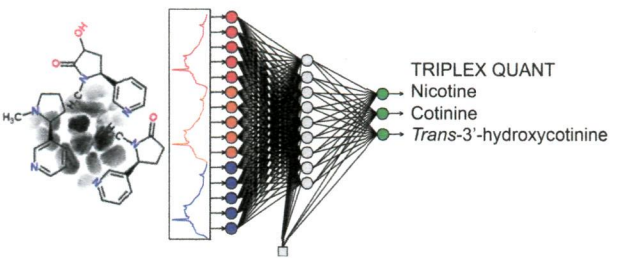


4820

Simultaneous multiplexed quantification of nicotine and its metabolites using surface enhanced Raman scattering

Omar Alharbi, Yun Xu and Royston Goodacre*

We have developed a SERS approach that can simultaneously detect the drug nicotine along with its two major metabolites cotinine and *trans*-3′-hydroxycotinine without recourse to lengthy chromatography.

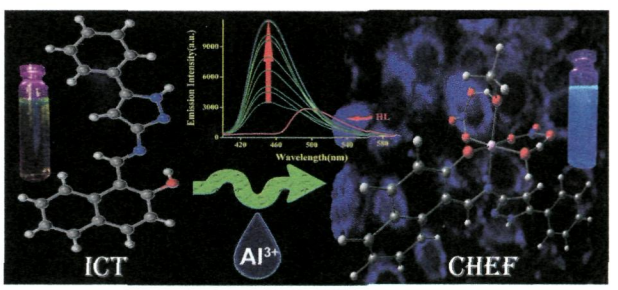


4828

A napthelene–pyrazol conjugate: Al(III) ion-selective blue shifting chemosensor applicable as biomarker in aqueous solution

Manjira Mukherjee, Siddhartha Pal, Somenath Lohar, Buddhadeb Sen, Supriti Sen, Samya Banerjee, Snehasis Banerjee and Pabitra Chattopadhyay*

A new crystallographically characterized napthelene–pyrazol conjugate acts as an Al(III) ion selective chemosensor in 100 mM HEPES buffer (water–DMSO 5 : 1, v/v) at biological pH. It is an efficient biomarker in detecting Al(III) ions in living cells.



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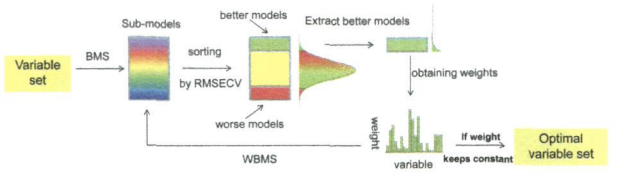
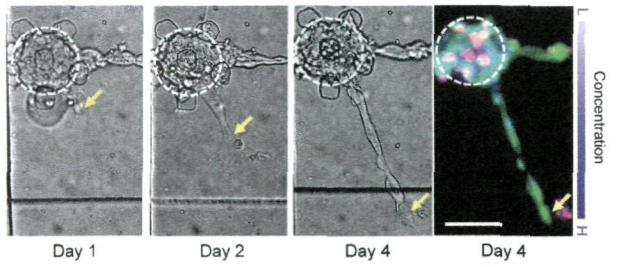


A novel variable selection approach that iteratively optimizes variable space using weighted binary matrix sampling

Bai-chuan Deng, Yong-huan Yun, Yi-zeng Liang* and Lun-zhao Yi

In this study, a new optimization algorithm called the Variable Iterative Space Shrinkage Approach (VISSA) that is based on the idea of model population analysis (MPA) is proposed for variable selection.

4846

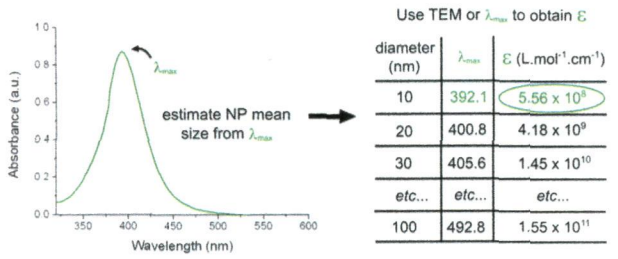


A spatiotemporally defined *in vitro* microenvironment for controllable signal delivery and drug screening

Ching-Te Kuo, Hao-Kai Liu, Guan-Syuan Huang, Chi-Hao Chang, Chen-Lin Chen, Ken-Chao Chen, Ruby Yun-Ju Huang, Ching-Hung Lin, Hsinyu Lee,* Chiun-Sheng Huang* and Andrew M. Wo*

An *in vitro* model of mimicking tumor microenvironments to study *in vivo*-like cancer migration and screening of inhibitors is demonstrated.

4855

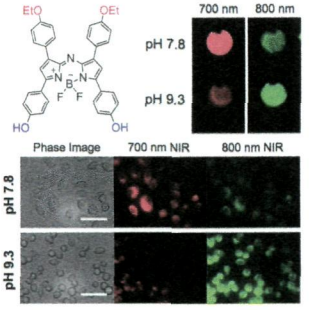


A rapid method to estimate the concentration of citrate capped silver nanoparticles from UV-visible light spectra

D. Paramelle, A. Sadovoy,* S. Gorelik, P. Free,* J. Hobley and D. G. Fernig

We present a generalized table of extinction coefficient data for silver nanoparticles, to allow calculation of silver nanoparticle concentrations.

4862



Hydroxylated near-infrared BODIPY fluorophores as intracellular pH sensors

Mohamed M. Salim, Eric A. Owens, Tielong Gao, Jeong Heon Lee, Hoon Hyun, Hak Soo Choi* and Maged Henary*

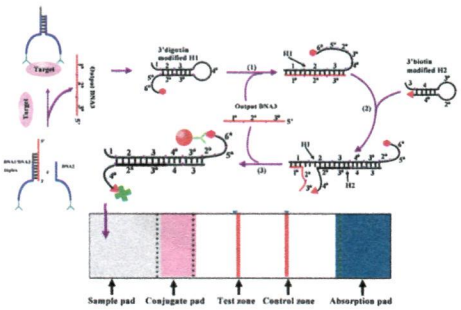
In this study, a series of new, highly sensitive BF_2-chelated tetraarylazadipyrromethane dyes are synthesized and analyzed to be suitable as on/off photo-induced electron transfer modulated fluorescent sensors for determination of intracellular pH.

4874

Strip biosensor for amplified detection of nerve growth factor-beta based on a molecular translator and catalytic DNA circuit

Jun Liu,* Ting Lai, Kejie Mu and Zheng Zhou

We have successfully fabricated a strip biosensor based on a molecular translator and catalytic DNA circuit for the detection of nerve growth factor-beta. This proposed assay has very high sensitivity and selectivity with a dynamic response ranging from 10 fM to 10 pM, and the detection limit was 10 fM of NGF-β.

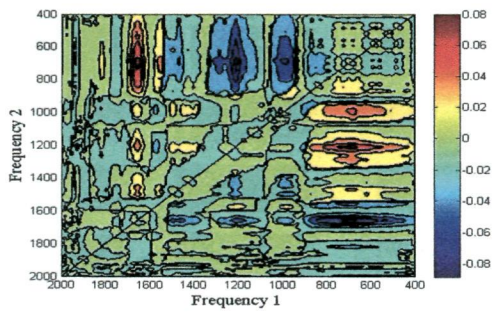


4879

A multi-scale approach of the mechanisms underlying exopolysaccharide auto-organization in the *Proteus mirabilis* extracellular matrix

Élodie Lahaye, Yun Qin, Frédéric Jamme, Thierry Aubry and Olivier Sire*

Supramolecular organization within the extracellular matrix triggers the swarming/consolidation alternation in response to a periodic variation of water activity.

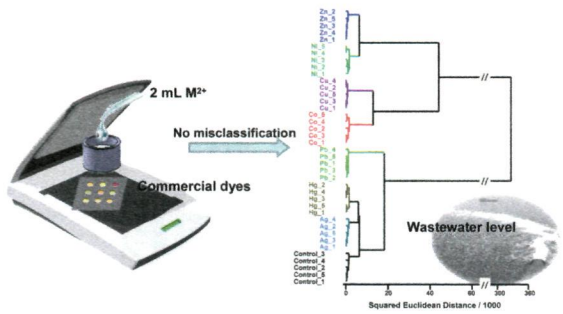


4887

Postage stamp-sized array sensor for the sensitive screening test of heavy-metal ions

Yu Zhang, Xiao Li, Hui Li, Ming Song, Liang Feng* and Yafeng Guan

Combining the filtration-based enrichment and array technologies-based pattern-recognition, seven heavy-metal ions at low concentrations were well discriminated using our postage stamp-sized array sensor.

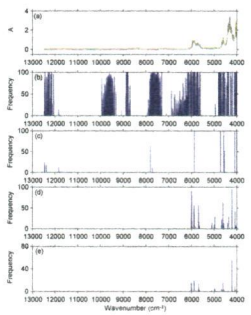


4894

A new spectral variable selection pattern using competitive adaptive reweighted sampling combined with successive projections algorithm

Guo Tang, Yue Huang,* Kuangda Tian, Xiangzhong Song, Hong Yan, Jing Hu, Yanmei Xiong and Shungeng Min*

The competitive adaptive reweighted sampling-successive projections algorithm (CARS-SPA) method was proposed as a novel variable selection approach to process multivariate calibration.



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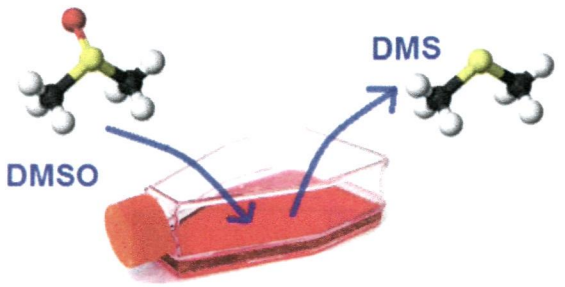
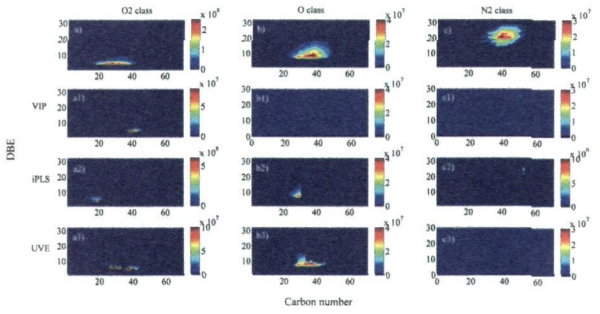


Counting cell number *in situ* by quantification of dimethyl sulphide in culture headspace

Thomas W. E. Chippendale, Patrik Španěl, David Smith* and Alicia J. El Haj

Enzymatic activity by cells reduces DMSO to DMS that can be analysed non-invasively to determine cell numbers in a culture.

4908

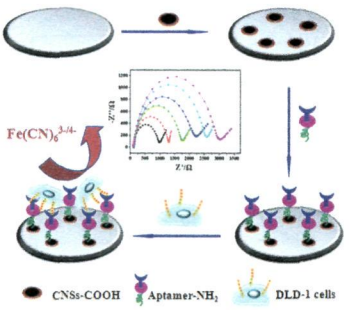


Petroleomics by electrospray ionization FT-ICR mass spectrometry coupled to partial least squares with variable selection methods: prediction of the total acid number of crude oils

Luciana A. Terra, Paulo R. Filgueiras, Lílian V. Tose, Wanderson Romão, Douglas D. de Souza, Eustáquio V. R. de Castro, Mirela S. L. de Oliveira, Júlio C. M. Dias and Ronei J. Poppi*

FT-ICR MS coupled to PLS regression in petroleomics.

4917

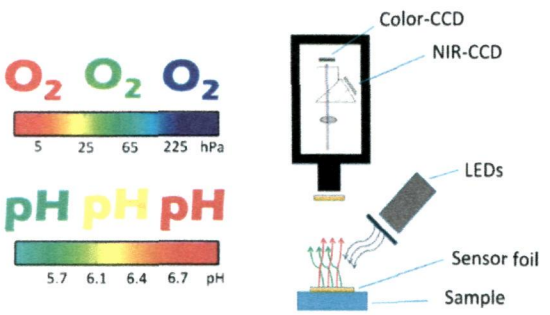


A novel aptasensor based on MUC-1 conjugated CNSs for ultrasensitive detection of tumor cells

Hongmei Cao, Daixin Ye, Qianqian Zhao, Juan Luo, Song Zhang and Jilie Kong*

A novel strategy for the quantitative determination of human colon cancer DLD-1 tumor cells utilizing an electrochemical aptasensor was developed by effective surface recognition between the Mucin 1 glycoprotein over-expressed on the cell membrane and the MUC-1 aptamer bound on carbon nanospheres (CNSs). The proposed protocols highlight a promising technique for the early monitoring of colon cancer.

4924



Low cost referenced luminescent imaging of oxygen and pH with a 2-CCD colour near infrared camera

Josef Ehgartner, Helmar Wiltsche, Sergey M. Borisov and Torsten Mayr*

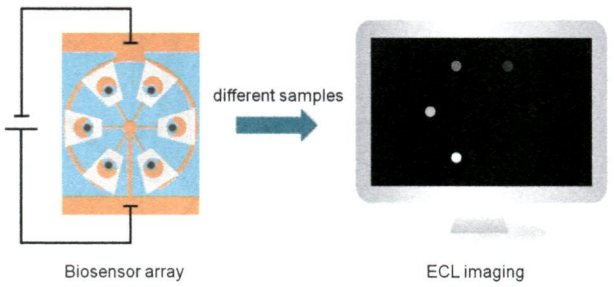
A low cost imaging set-up for NIR-emitting optical chemical sensors for pH and oxygen based on a 2-CCD camera is presented.

4934

A novel biosensor array with a wheel-like pattern for glucose, lactate and choline based on electrochemiluminescence imaging

Zhenyu Zhou, Linru Xu, Suozhu Wu and Bin Su*

An ECL imaging biosensor was fabricated for detecting glucose, lactate and choline, as well as for simultaneous multicomponent assay.

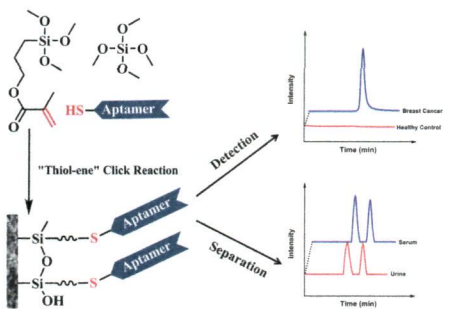


4940

Facile one-pot synthesis of a aptamer-based organic–silica hybrid monolithic capillary column by "thiol–ene" click chemistry for detection of enantiomers of chemotherapeutic anthracyclines

Han-Peng Jiang, Jiu-Xia Zhu, Chunyan Peng, Jiajia Gao, Fang Zheng, Yu-Xiu Xiao, Yu-Qi Feng* and Bi-Feng Yuan*

Preparation of aptamer-based organic–silica hybrid monolithic capillary column by "thiol–ene" click chemistry for the detection of the enantiomers of chemotherapeutic anthracyclines.

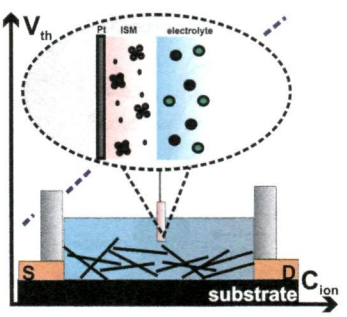


4947

Selective ion-sensing with membrane-functionalized electrolyte-gated carbon nanotube field-effect transistors

K. Melzer,* A. M. Münzer, E. Jaworska, K. Maksymiuk, A. Michalska and G. Scarpa

By modifying the gate-electrode of electrolyte-gated carbon nanotube network based field-effect transistors with different polymeric ion-selective membranes, an ion-selective response towards biologically relevant ions (K^+, Ca^{2+} and Cl^-) in solutions with and without an ionic background is reported.

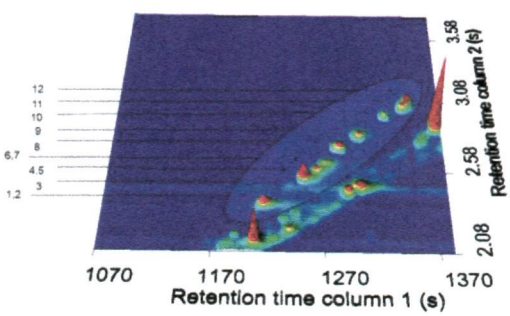


4955

Detection of multiple steroidal compounds in synthetic urine using comprehensive gas chromatography-mass spectrometry (GC×GC-MS) combined with a molecularly imprinted polymer clean-up protocol

Adnan Zulfiqar, Geraint Morgan and Nicholas W. Turner*

A rapid multiple steroid detection method, without the requirement of derivitisation, using comprehensive gas chromatography and a molecularly imprinted clean-up protocol.



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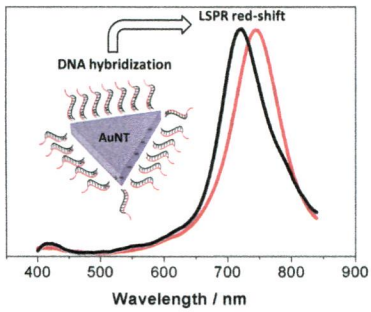
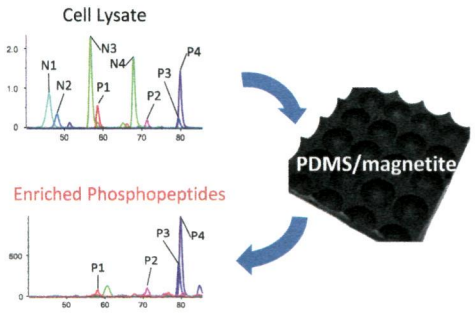


Localized surface plasmon resonance (LSPR) biosensing using gold nanotriangles: detection of DNA hybridization events at room temperature

Leonor Soares, Andrea Csáki, Jacqueline Jatschka, Wolfgang Fritzsche, Orfeu Flores, Ricardo Franco* and Eulália Pereira

Hybridization of target DNA to AuNT-probes causes LSPR to red-shift.

4974

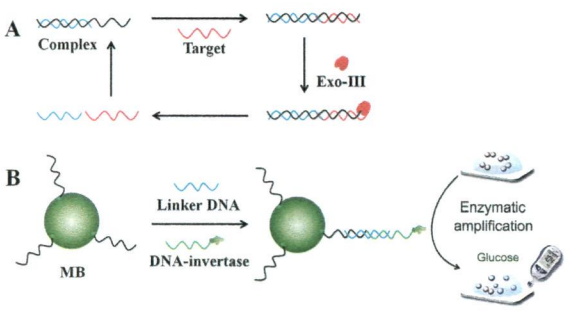


Magnetite-doped polydimethylsiloxane (PDMS) for phosphopeptide enrichment

Mairi E. Sandison, K. Tveen Jensen, F. Gesellchen, J. M. Cooper and A. R. Pitt*

A moldable, reusable magnetite-doped polydimethylsiloxane (PDMS) substrate for phosphopeptide enrichment.

4982

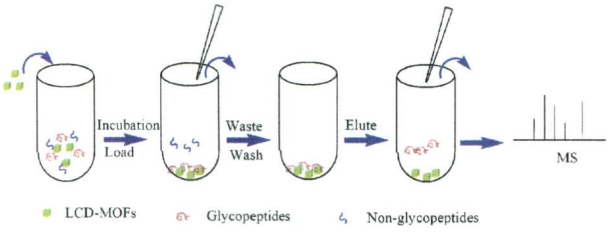


Portable and sensitive quantitative detection of DNA using personal glucose meters and exonuclease III-assisted signal amplification

Xu Xue-tao,* Liang Kai-yi and Zeng Jia-ying

A portable and sensitive quantitative DNA detection method using personal glucose meters and Exonuclease III-assisted signal amplification.

4987



Efficient enrichment of glycopeptides using metal–organic frameworks by hydrophilic interaction chromatography

Yongsheng Ji, Zhichao Xiong, Guang Huang, Jing Liu, Zhang Zhang, Zheyi Liu, Junjie Ou, Mingliang Ye and Hanfa Zou*

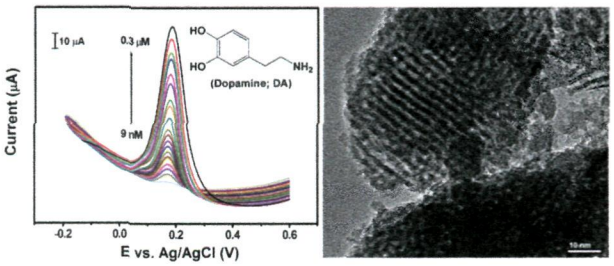
An efficient strategy of glycopeptide enrichment using metal–organic frameworks by hydrophilic interaction chromatography was demonstrated to analyze *N*-linked glycopeptides in mouse liver.

4994

Porous carbon-modified electrodes as highly selective and sensitive sensors for detection of dopamine

Pitchaimani Veerakumar, Rajesh Madhu, Shen-Ming Chen,* Chin-Te Hung, Pi-Hsi Tang, Chen-Bin Wang and Shang-Bin Liu*

Carbon porous material (CPM)-modified electrode with extraordinary sensitivity and selectivity for the detection of dopamine (DA) is reported.

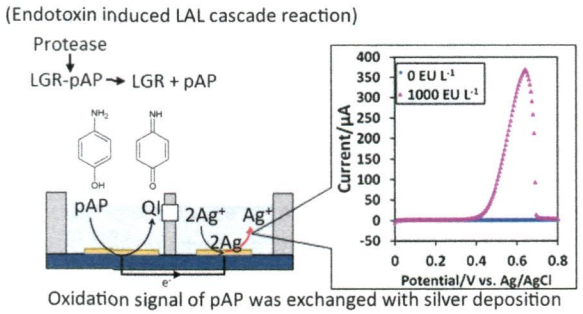


5001

Electrochemical sensor with substitutional stripping voltammetry for highly sensitive endotoxin assay

Shinichiro Takano, Kumi Y. Inoue,* Satoko Takahashi, Kosuke Ino, Hitoshi Shiku and Tomokazu Matsue*

An extra-highly sensitive sensor for detection of endotoxin was developed. In this sensor, *p*-aminophenol (*p*AP) was generated with endotoxin-induced enzyme reaction and detected with substitutional stripping voltammetry.

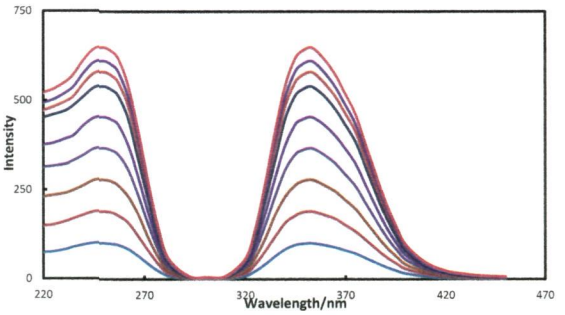


5007

A novel spectrofluorometric method for the determination of arsenic in human hair using Dy_2O_3-doped CeO_2 nanoparticles

Mohammad Saeid Hosseini* and Foroogh Belador

This paper describes a novel spectrofluorometric method for the determination of arsenic in human hair using Dy_2O_3-doped CeO_2 nanoparticles.

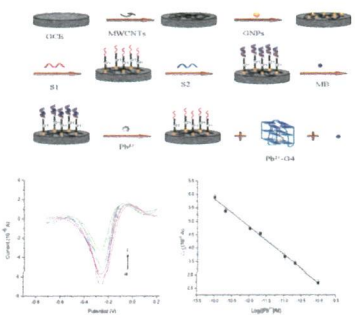


5014

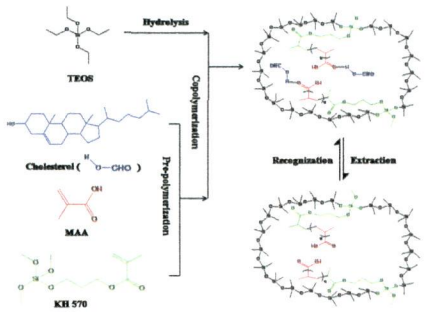
Highly sensitive electrochemical sensor using a MWCNTs/GNPs-modified electrode for lead (II) detection based on Pb^{2+}-induced G-rich DNA conformation

Yuan Zhu, Guang-ming Zeng,* Yi Zhang,* Lin Tang, Jun Chen, Min Cheng, Li-hua Zhang, Ling He, Yuan Guo, Xiao-xiao He, Ming-yong Lai and Yi-bin He

An electrochemical DNA sensor was shown to be superior to other latest DNAzyme-based biosensors for detecting Pb^{2+}, with a low detection of 4.3×10^{-15} M.



5021

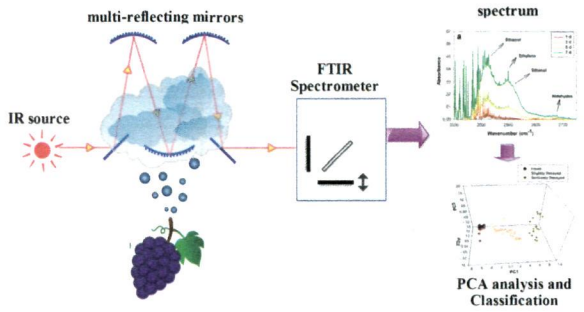


Development of molecularly imprinted poly(methacrylic acid)/silica for clean-up and selective extraction of cholesterol in milk prior to analysis by HPLC-UV

D. N. Clausen, J. V. Visentainer and C. R. T. Tarley*

In the present paper the assessment of a novel molecularly imprinted polymer, poly(methacrylic acid)/silica, for clean-up and selective extraction of cholesterol in milk samples is described.

5028



Analysis and discrimination of grape spoilage *via* volatiles: a comparison between long optical path Fourier-transform-infrared spectroscopy and sensor arrays

D. Dong,* W. Zheng, W. Wang, X. Zhao, L. Jiao and C. Zhao*

Infrared spectroscopy and sensor arrays have been used to differentiate the grapes in different spoilage stages *via* their volatiles.