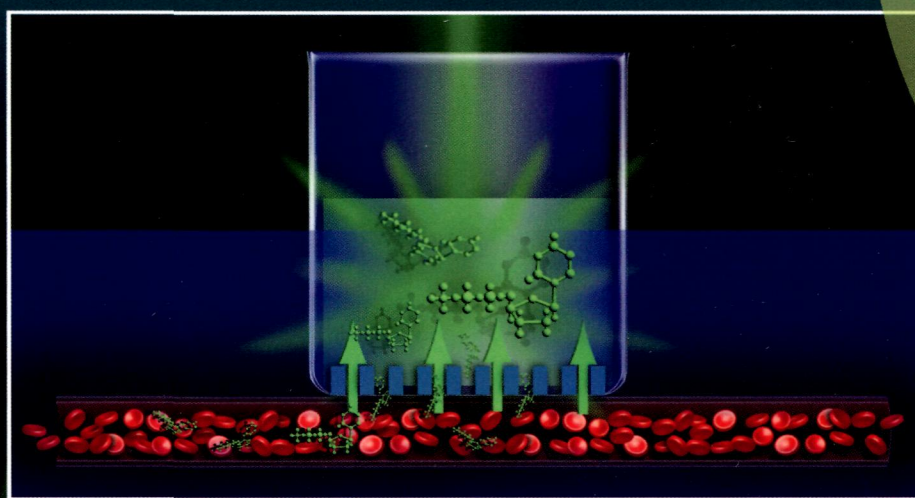


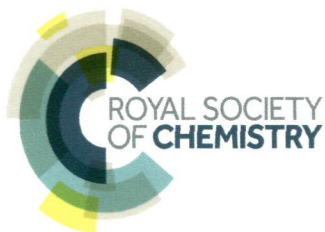
Analyst

www.rsc.org/analyst



Themed issue: Probe and chip approaches to cell analysis

ISSN 0003-2654



PAPER

Dana M. Spence *et al.*

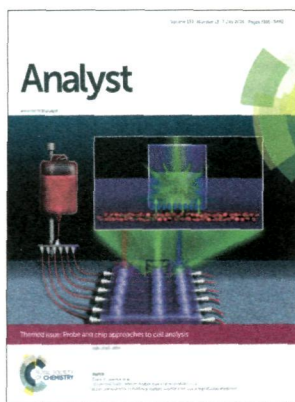
3D-printed fluidic devices enable quantitative evaluation of blood components in modified storage solutions for use in transfusion medicine

www.rsc.org/analyst

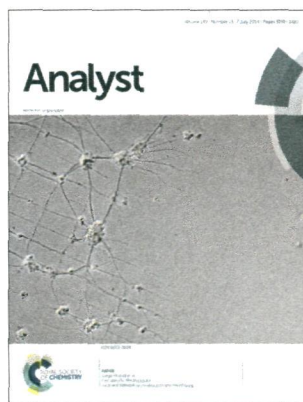
The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

IN THIS ISSUE

ISSN 0003-2654 CODEN ANALAO 139(13) 3191–3482 (2014)



Cover
See Dana M. Spence *et al.*,
pp. 3219–3226.
Image reproduced by
permission of Dana
M. Spence from *Analyst*,
2014, 139, 3219.



Inside cover
See Serge Picaud *et al.*,
pp. 3281–3289.
Image reproduced
by permission of
Serge Picaud from *Analyst*,
2014, 139, 3281.

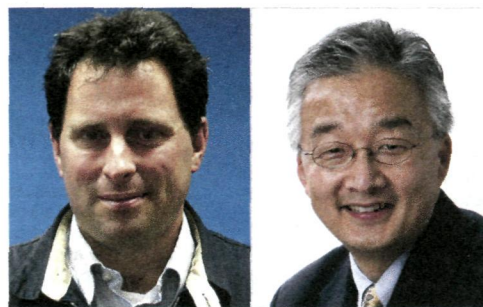
THEMED ISSUE ARTICLES

EDITORIAL

3205

Editorial – probe and chip approaches to cell analysis

This Editorial introduces *Analyst's* themed collection on probe and chip approaches to cell analysis, guest edited by Jonathan Cooper and Luke Lee.



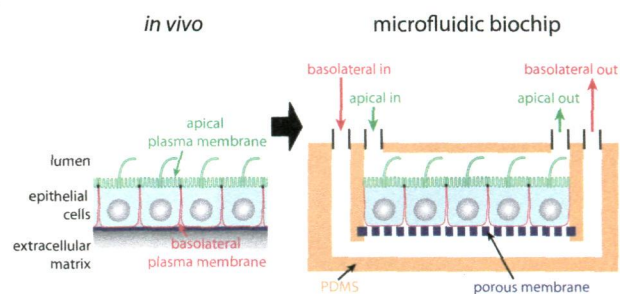
MINIREVIEW

3206

Microfluidic approaches for epithelial cell layer culture and characterisation

Roland Thuenauer,* Enrique Rodriguez-Boulan and Winfried Römer

Novel *in vitro* models of epithelia in which the *in vivo* microenvironment of epithelial cells is precisely reconstituted can be realised with microfluidic biochips.



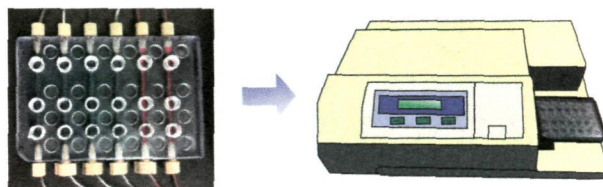
Федеральное государственное
бюджетное учреждение науки
Центральная научная библиотека
Уральского отделения
Российской академии наук (ЦНБ УрО РАН)

3219

3D-printed fluidic devices enable quantitative evaluation of blood components in modified storage solutions for use in transfusion medicine

Chengpeng Chen, Yimeng Wang, Sarah Y. Lockwood and Dana M. Spence*

A fluidic device constructed with a 3D-printer can be used to investigate stored blood components with subsequent high-throughput calibration and readout with a standard plate reader.

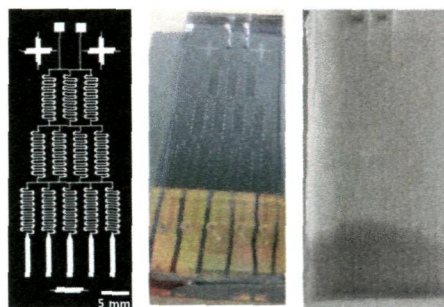


3227

Microfluidic-SERS devices for one shot limit-of-detection

Donghyuk Kim, Antonio R. Campos, Ashish Datt, Zhe Gao, Matthew Rycenga, Nathan D. Burrows, Nathan G. Greeneltch, Chad A. Mirkin, Catherine J. Murphy, Richard P. Van Duyne and Christy L. Haynes*

Microfluidic sensing platforms facilitate parallel, low sample volume detection using various optical signal transduction mechanisms.

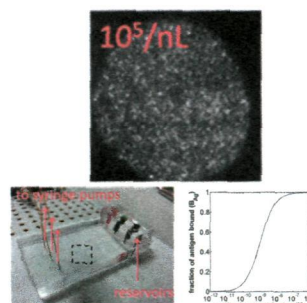


3235

Absolute quantification of protein copy number using a single-molecule-sensitive microarray

Edward Burgin, Ali Salehi-Reyhani, Michael Barclay, Aidan Brown, Joseph Kaplinsky, Miroslava Novakova, Mark A. A. Neil, Oscar Ces, Keith R. Willison and David R. Klug*

We report the use of a microfluidic microarray incorporating single molecule detection for the absolute quantification of protein copy number in solution.

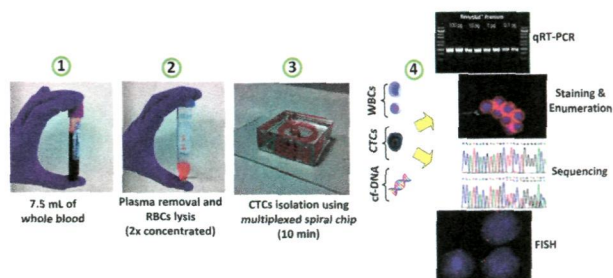


3245

An ultra-high-throughput spiral microfluidic biochip for the enrichment of circulating tumor cells

Majid Ebrahimi Warkiani, Bee Luan Khoo, Daniel Shao-Weng Tan, Ali Asgar S. Bhagat, Wan-Teck Lim, Yoon Sim Yap, Soo Chin Lee, Ross A. Soo, Jongyoon Han* and Chwee Teck Lim*

We demonstrate the high-throughput and high-resolution separation of rare circulating tumor cells (CTCs) from blood using a multiplexed spiral microfluidic device.

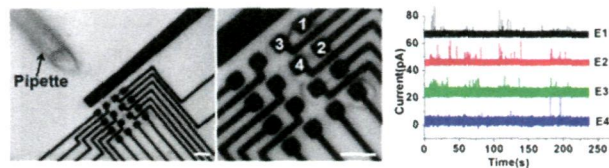


3290

Simultaneous study of subcellular exocytosis with individually addressable multiple microelectrodes

Jun Wang and Andrew G. Ewing*

Spatial and temporal resolution of single cell exocytosis study with multiple microelectrodes.

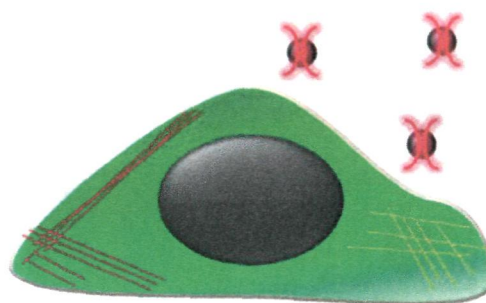


3296

The grab-and-drop protocol: a novel strategy for membrane protein isolation and reconstitution from single cells

Angelika Schrems, John Phillips, Duncan Casey, Douglas Wylie, Mira Novakova, Uwe B. Sleytr, David Klug, Mark A. A. Neil, Bernhard Schuster and Oscar Ces*

Samples of cell membrane were non-destructively removed from individual, live cells using optically trapped beads, and deposited into a supported lipid bilayer mounted on an S-layer protein-coated substrate.

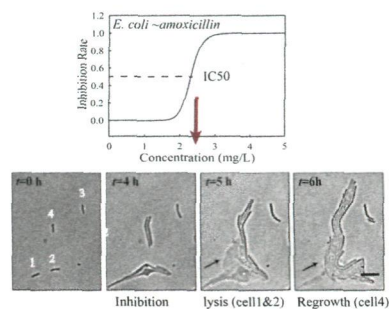


3305

Single cell growth rate and morphological dynamics revealing an "opportunistic" persistence

Bing Li, Yong Qiu,* Andrew Glidle, Jon Cooper, HanChang Shi and HuaBing Yin*

A new form of bacterial persistence was observed. Normal *E. coli* cells inhibited by amoxicillin recovered from the killing process when they had an opportunity to utilize the cytoplasm released from lysed cells close-by.

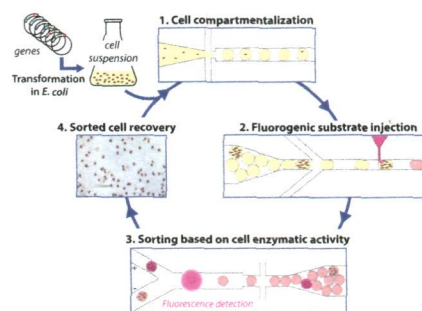


3314

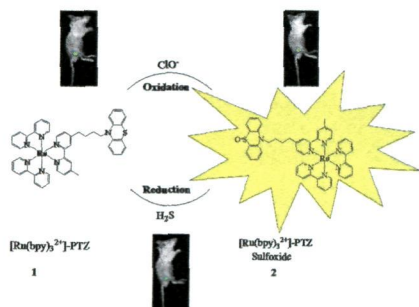
CotA laccase: high-throughput manipulation and analysis of recombinant enzyme libraries expressed in *E. coli* using droplet-based microfluidics

Thomas Beneyton, Faith Coldren, Jean-Christophe Baret, Andrew D. Griffiths and Valérie Taly*

A high-throughput cell analysis and sorting platform using droplet-based microfluidics is introduced for directed evolution of recombinant CotA laccase expressed in *E. coli*.



3324

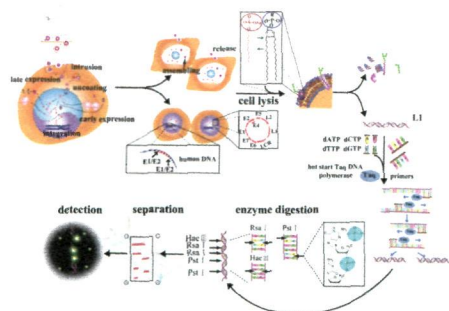


Reversible and selective luminescent determination of $\text{ClO}^-/\text{H}_2\text{S}$ redox cycle *in vitro* and *in vivo* based on a ruthenium trisbipyridyl probe

Fengyu Liu, Yulong Gao, Jitao Wang and Shiguo Sun*

A reversible and highly selective luminescent probe was successfully employed for the determination of ClO^- and H_2S and for monitoring the $\text{ClO}^-/\text{H}_2\text{S}$ redox cycle both *in vitro* and *in vivo*.

3330



High-throughput and automatic typing *via* human papillomavirus identification map for cervical cancer screening and prognosis

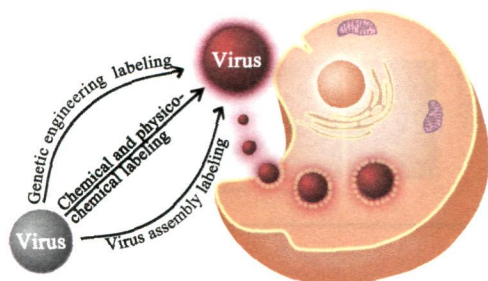
Linglu Yi, Xueqin Xu,* Xuexia Lin, Haifang Li, Yuan Ma and Jin-Ming Lin*

Human papillomavirus (HPV) identification with a combination of HPV screening system and restriction fragment length polymorphism (RFLP) genotyping system.

REGULAR RESEARCH ARTICLES

CRITICAL REVIEW

3336



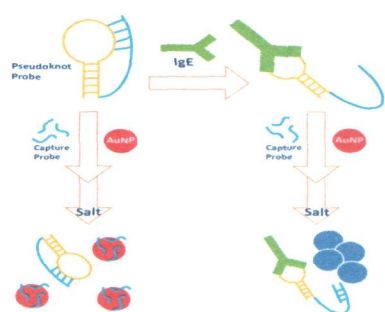
Progress on the labeling and single-particle tracking technologies of viruses

Li-Li Huang and Hai-Yan Xie*

We review recent advances in virus labeling and the emerging fluorescence imaging technologies used in the imaging and tracking of viruses.

COMMUNICATIONS

3347



Label-free colorimetric aptasensor for IgE using DNA pseudoknot probe

Chia-Chen Chang, Chen-Yu Chen, Xihong Zhao, Tzu-Heng Wu, Shih-Chung Wei and Chii-Wann Lin*

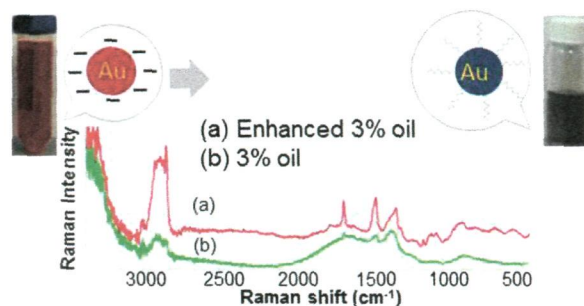
A simple design of a label-free colorimetric assay for IgE was demonstrated based on a structure-switching aptamer with a low detection limit of 0.2 nM and high selectivity.

3352

Fabrication of lipophilic gold nanoparticles for studying lipids by surface enhanced Raman spectroscopy (SERS)

Michael Driver, Yue Li, Jinkai Zheng, Eric Decker, David Julian McClements and Lili He*

A simple fabrication method for preparing lipophilic gold nanoparticles (AuNPs) suitable for use as substrates in surface-enhanced Raman scattering (SERS) applications of lipids was developed.

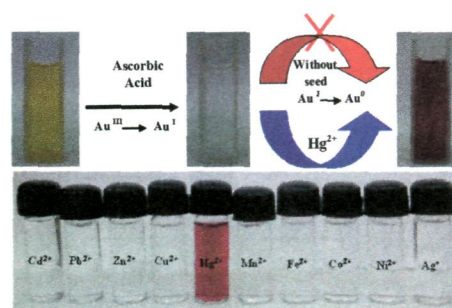


3356

Unusual seedless approach to gold nanoparticle synthesis: application to selective rapid naked eye detection of mercury(II)

Sukeri Anandhakumar, Rajendran Rajaram and Jayaraman Mathiyarasu*

Highly selective and sensitive naked eye detection of Hg^{2+} was achieved based on the Hg^{2+} - Au^+ interaction and Au^0 was observed in the absence of a seed.

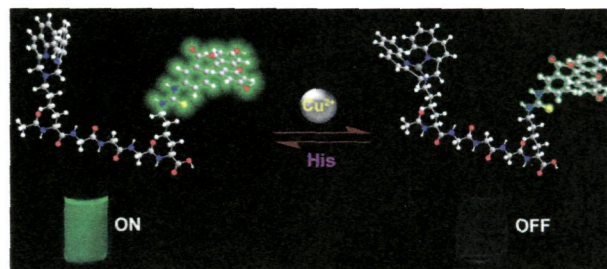


3360

A fluorescent switch for sequentially and selectively sensing copper(II) and L-histidine *in vitro* and in living cells

Xiaojing Wang, Qingqing Miao, Tingjie Song, Qingpan Yuan, Jinhao Gao and Gaolin Liang*

A new fluorescent switch was developed for sequential and selective sensing of Cu^{2+} and L-histidine (L-His) *in vitro* and in living cells.

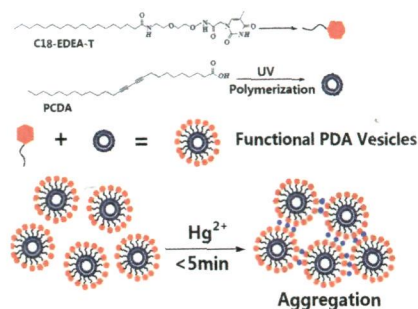


3365

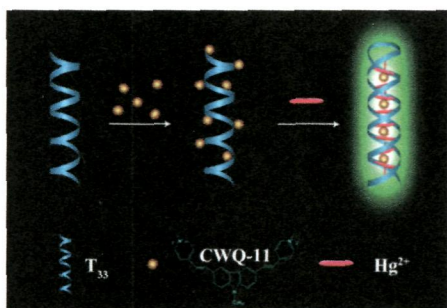
Sensitive naked-eye detection of Hg^{2+} based on the aggregation and filtration of thymine functionalized vesicles caused by selective interaction between thymine and Hg^{2+}

Xue Ma, Zhonghan Sheng and Long Jiang*

A sensitive and low-cost method based on rapid interaction between functionalized PDA vesicles and Hg^{2+} for the naked-eye detection of Hg^{2+} .



3369



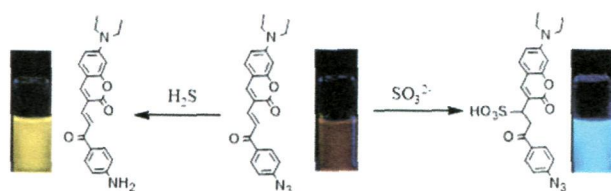
A fluorescent probe with restricted intramolecular rotation-induced emission for label-free detection of mercury ions

Shengliang Li, Hua Deng, Weipeng Cao, Chunqiu Zhang, Shubin Jin, Xiangdong Xue, Jinchao Zhang, Feng Li, Guozhang Zou* and Xing-Jie Liang*

The restricted intramolecular rotation-induced emission probe for label-free detection of mercury ions.

PAPERS

3373

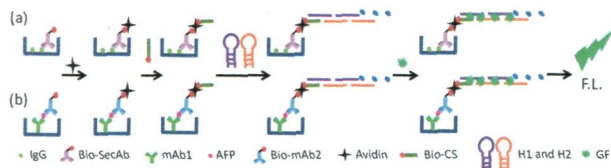


A coumarin-based fluorescent probe for differential identification of sulfide and sulfite in CTAB micelle solution

Haiyu Tian, Junhong Qian,* Qian Sun, Chenjia Jiang, Runsheng Zhang and Weibing Zhang*

A fluorescent probe TSSP-N₃ was developed to discriminate between sulfite and sulfide, which was clear to the naked eye.

3378

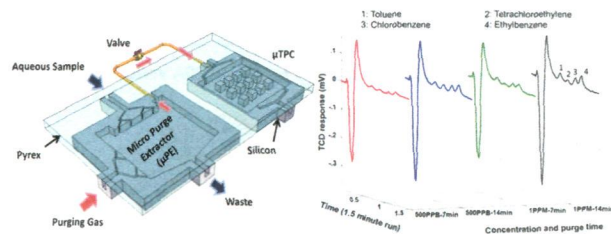


Hybridization chain reaction-based fluorescence immunoassay using DNA intercalating dye for signal readout

Yan Deng, Ji Nie, Xiao-hui Zhang, Ming-Zhe Zhao, Ying-Lin Zhou* and Xin-Xiang Zhang*

A hybridization chain reaction (HCR)-based fluorescence immunoassay was developed with the signal amplified by intercalating DNA dye into an HCR product.

3384



A purge and trap integrated microGC platform for chemical identification in aqueous samples

Muhammad Akbar, Shree Narayanan, Michael Restaino and Masoud Agah*

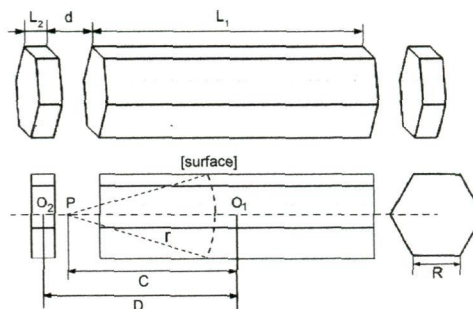
This paper describes the first hybrid integration of microgas chromatography components with a micro-purging chip for chemical sensing in aqueous samples.

3393

Separation-dependence evolution of inter-particle interaction in the oriented-attachment growth of nanorods: a case of hexagonal nanocrystals

Yuanqiang Song, Aifang Liu, Yu Pan, Xiaoning Wang, Jiarui Hu, Xiaorong Hou, Xiao Lin and Weidong He*

By focusing on hexagonal nanorods, the countering effects of van der Waals interaction and Coulombic interaction on the oriented attachment growth of 1D nanocrystals are investigated.

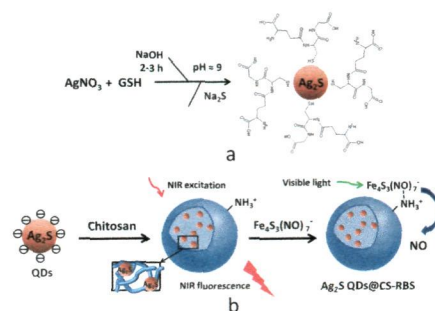


3398

Visible light-triggered nitric oxide release from near-infrared fluorescent nanospheric vehicles

Lianjiang Tan,* Ajun Wan,* Xiaomin Zhu and Huili Li

Ag₂S QDs@CS-RBS nanospheres were designed and synthesized for light-triggered NO release and near-infrared fluorescence bioimaging.

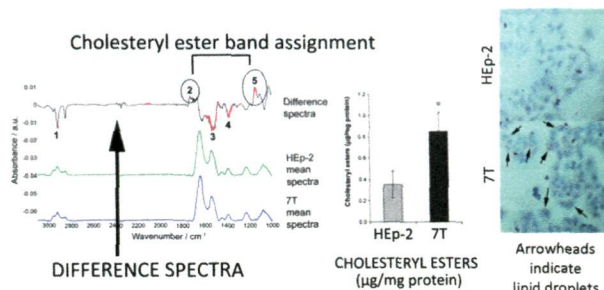


3407

FTIR spectroscopy reveals lipid droplets in drug resistant laryngeal carcinoma cells through detection of increased ester vibrational bands intensity

Sanjica Rak, Tihana De Zan, Jasminka Stefulj, Marin Kosović, Ozren Gamulin* and Maja Osmak*

Specific differences in FTIR spectra of HEp-2 cells and their multidrug resistant 7T subline were observed and the increased cholesteryl ester content and enhanced lipid droplet formation in 7T cells were verified.

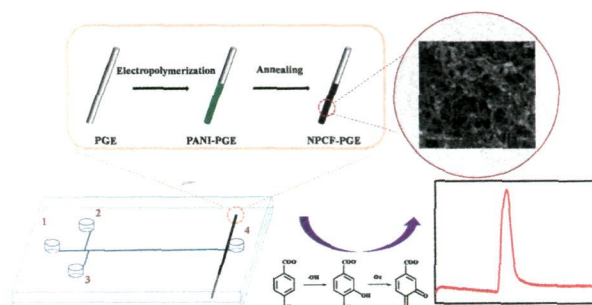


3416

A rapid and sensitive method for hydroxyl radical detection on a microfluidic chip using an N-doped porous carbon nanofiber modified pencil graphite electrode

Jun Ouyang, Zhong-Qiu Li, Jing Zhang, Chen Wang, Jiong Wang, Xing-Hua Xia* and Guo-Jun Zhou*

An N-doped porous carbon nanofiber modified electrode fabricated for electrochemical detection of hydroxyl radicals.



3423

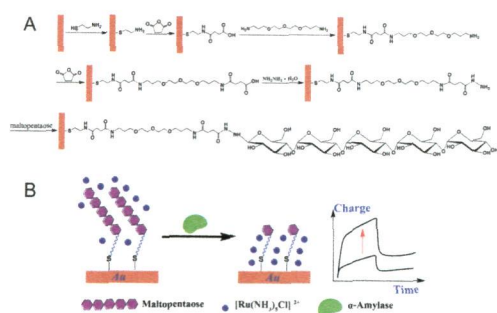


Determination of specific DNA sequences and their hybridisation processes by elemental labelling followed by SEC-ICP-MS detection

Lucía López-Fernández, Elisa Blanco-González and Jörg Bettmer*

Detection of specific DNA sequences is nowadays an important tool in many scientific areas such as forensic science or clinical diagnosis.

3429

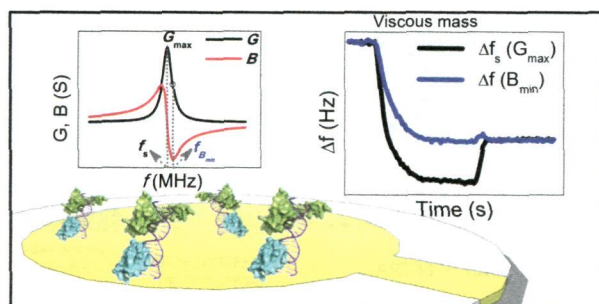


A novel electrochemical method to determine α -amylase activity

Juan Zhang, Junhui Cui, Ying Liu, Yangyang Chen and Genxi Li*

In this paper, we report a novel electrochemical method that can be developed as a biosensor for simple and direct determination of α -amylase activity.

3434

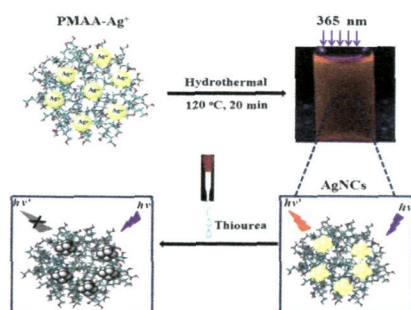


Kinetic characterization of the retinoic X receptor binding to specific and unspecific DNA oligoduplexes with a quartz crystal microbalance

Rogério M. M. Rodrigues, Jorge de-Carvalho and Guilherme N. M. Ferreira*

A frequency at the susceptance minimum (f_{Bmin}) is applied to assess the kinetics of RXR α to specific and non-specific oligoduplexes.

3441



One-pot hydrothermal synthesis of orange fluorescent silver nanoclusters as a general probe for sulfides

Jing Lan, Pu Zhang, Ting Ting Wang, Yong Chang, Shao Qing Lie, Zhu Lian Wu, Zhong De Liu, Yuan Fang Li and Cheng Zhi Huang*

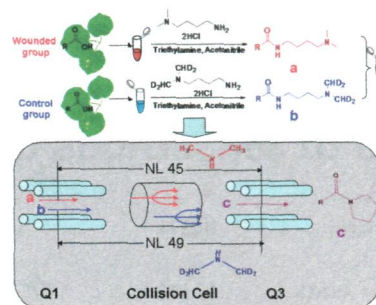
Using PMAA, a common polyelectrolyte, as a reducing agent and a capping agent, a rapid hydrothermal synthesis was used to prepare fluorescent AgNCs, which were highly photostable, fluorescent and low toxic, but quantitatively quenched by thiourea.

3446

Isotope labelling – paired homologous double neutral loss scan-mass spectrometry for profiling of metabolites with a carboxyl group

Yun-Qing Huang, Qiu-Yi Wang, Jia-Qi Liu, Yan-Hong Hao, Bi-Feng Yuan and Yu-Qi Feng*

The development of a method for non-targeted screening of metabolites with a carboxyl group by high performance liquid chromatography-mass spectrometry with paired homologous double neutral loss scan mode after *in vitro* isotope labelling was reported.

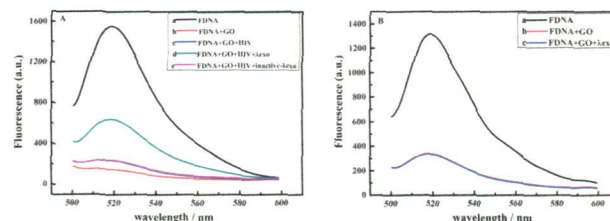


3455

An enzyme-aided amplification strategy for sensitive detection of DNA utilizing graphene oxide (GO) as a fluorescence quencher

Jing Zhang, Mangjuan Tao and Yan Jin*

A facile, sensitive and rapid method has been developed for detection of disease-related DNA based on lambda exonuclease-aided signal amplification by utilizing graphene oxide (GO) as a fluorescence quencher.

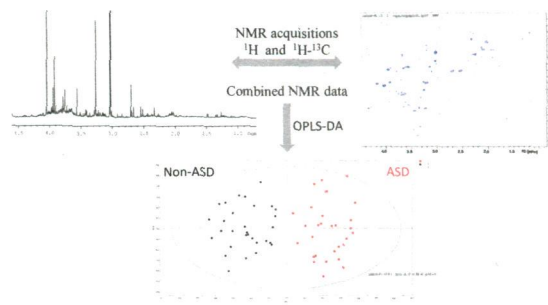


3460

Combined ^1H -NMR and ^1H - ^{13}C HSQC-NMR to improve urinary screening in autism spectrum disorders

Lydie Nadal-Desbarats*, Nacima Aidoud, Patrick Emond, H el ene Blasco, Isabelle Filipiak, Pierre Sarda, Fr ed erique Bonnet-Brilhaut, Sylvie Mavel and Christian R. Andres

Improvement of urinary screening by combining ^1H and ^{13}C HSQC NMR data in metabolomics: application in ASD.

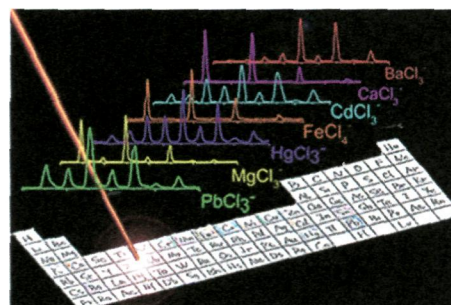


3469

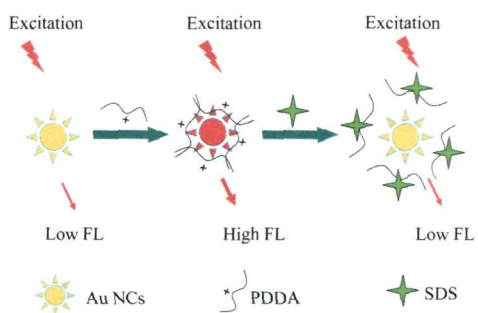
Organic salt NEDC (*N*-naphthylethylenediamine dihydrochloride) assisted laser desorption ionization mass spectrometry for identification of metal ions in real samples

Jian Hou, Suming Chen, Ning Zhang, Huihui Liu, Jianing Wang, Qing He, Jiyun Wang, Shaoxiang Xiong and Zongxiu Nie*

Organic salt NEDC has qualified as a good matrix for the MALDI MS analysis of metal ions.



3476



A fluorescent sensor to detect sodium dodecyl sulfate based on the glutathione-stabilized gold nanoclusters/poly diallyldimethylammonium chloride system

Chun-Lan Zheng, Zhong-Xiang Ji, Jian Zhang and Shou-Nian Ding*

Glutathione-stabilized gold nanoclusters and poly(diallyldimethylammonium)chloride enhanced fluorescent system was used to detect sodium dodecyl sulfate.