

# Analyst

rsc.li/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 148(24) 6133–6376 (2023)



### Cover

See Ryo Kato and  
Kaisei Maeda *et al.*  
pp. 6241–6247.

Image reproduced by  
permission of Ryo Kato and  
Kaisei Maeda from *Analyst*,  
2023, **148**, 6241.

## EDITORIAL

6143

### SPEC 2022: International Conference on Clinical Spectroscopy

Aidan D. Meade,\* Fiona M. Lyng and Hugh J. Byrne

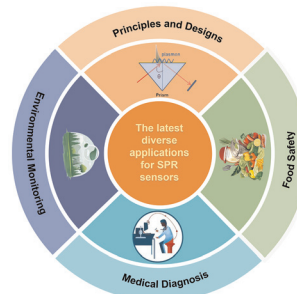


## CRITICAL REVIEWS

6146

### Surface plasmonic biosensors: principles, designs and applications

Hao Liu, Yusheng Fu, Rongzhi Yang, Jiuchuan Guo\* and Jinhong Guo\*



## Editorial Staff

### Executive Editor

Rebecca Garton

### Deputy Editor

Alice Smallwood

### Editorial Production Manager

Sarah Whitehouse

### Development Editor

Celeste Brady

### Publishing Editors

Gabriel Clarke, Derya Kara-Fisher,  
Emma Stephen, Ziva Whitelock

### Publishing Assistant

Andrea Whiteside

### Editorial Assistant

Leo Curtis

### Publisher

Jeanne Andres

For queries about submitted articles please contact Sarah Whitehouse, Editorial production manager, in the first instance. E-mail [analyst@rsc.org](mailto:analyst@rsc.org)

For pre-submission queries please contact Rebecca Garton, Executive editor. E-mail [analyst-rsc@rsc.org](mailto:analyst-rsc@rsc.org)

Analyst (electronic: ISSN 1364-5528) is published 24 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF.

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to the Royal Society of Chemistry Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK  
Tel +44 (0)1223 432398; E-mail [orders@rsc.org](mailto:orders@rsc.org)

2023 Annual (electronic) subscription price: £2372; US\$4152. Customers in Canada will be subject to a surcharge to cover GST. Customers in the EU subscribing to the electronic version only will be charged VAT.

If you take an institutional subscription to any Royal Society of Chemistry journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at [www.rsc.org/ip](http://www.rsc.org/ip)

Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank.

Whilst this material has been produced with all due care, the Royal Society of Chemistry cannot be held responsible or liable for its accuracy and completeness, nor for any consequences arising from any errors or the use of the information contained in this publication. The publication of advertisements does not constitute any endorsement by the Royal Society of Chemistry or Authors of any products advertised. The views and opinions advanced by contributors do not necessarily reflect those of the Royal Society of Chemistry which shall not be liable for any resulting loss or damage arising as a result of reliance upon this material. The Royal Society of Chemistry is a charity, registered in England and Wales, Number 207890, and a company incorporated in England by Royal Charter (Registered No. RC000524), registered office: Burlington House, Piccadilly, London W1J 0BA, UK, Telephone: +44 (0) 207 4378 6556.

### Advertisement sales:

Tel +44 (0) 1223 432246; Fax +44 (0) 1223 426017;  
E-mail [advertising@rsc.org](mailto:advertising@rsc.org)

For marketing opportunities relating to this journal, contact [marketing@rsc.org](mailto:marketing@rsc.org)

# Analyst

[rsc.li/analyst](http://rsc.li/analyst)

The home of premier fundamental discoveries, inventions and applications in the analytical and bioanalytical sciences

## Editorial Board

### Editor-in-Chief

Norman Dovichi, University of Notre Dame, USA

### Associate Editors

Damien Arrigan, Curtin University, Australia  
Ryan Bailey, University of Michigan, USA  
Jaebum Choo, Chung-Ang University, South Korea

Karen Faulds, University of Strathclyde, UK  
Hideaki Hisamoto, Osaka Metropolitan University, Japan

Baohong Liu, Fudan University, China  
Nicole Pamme, Stockholm University, Sweden

Hua-Zhong Yu, Simon Fraser University, Canada  
Jun-Jie Zhu, Nanjing University, China

### Members

Susan Lunte, University of Kansas, USA

## Advisory Board

Matthew Baker, University of Central Lancashire, UK  
Paul W Bohn, University of Notre Dame, USA  
Claudia Conti, CNR, Italy  
R Graham Cooks, Purdue University, USA  
Jeffrey Dick, Purdue University, USA  
Volker K. Deckert, University of Jena, Germany  
Joshua Edel, Imperial College London, UK  
Qun Fang, Zhejiang University, China  
Facundo Fernandez, Georgia Institute of Technology, USA  
Roy Goodacre, University of Liverpool, UK  
Duncan Graham, University of Strathclyde, UK  
Robert T Kennedy, University of Michigan, USA

USA  
Kagan Kerman, University of Toronto, Canada  
Christine Kranz, Ulm University, Germany  
Annamalai Senthil Kumar, Vellore Institute of Technology University, India  
Xiujun Li, University of Texas at El Paso, USA  
Lanqun Mao, Institute of Chemistry, Chinese Academy of Sciences, China  
Maria Marin, University of East Anglia, UK  
Pavel Matousek, Rutherford Appleton Laboratory, UK  
Wei Min, Columbia University, USA  
Boris Mizaikoff, University of Ulm, Germany  
Prakash Chandra Mondal, Indian Institute of Technology Kanpur, India

Howbeer Muhamadali, University of Liverpool, UK  
Takeaki Ozawa, University of Tokyo, Japan  
Ashley Ross, University of Cincinnati, USA  
Muhammad Shiddiky, Griffith University, Australia  
Debbie Silvester, Curtin University, Australia  
Steven A. Soper, University of Kansas, USA  
Dana Spence, Michigan State University, USA  
Nick Stone, University of Exeter, UK  
Evan Williams, University of California, USA  
Chaoyong James Yang, Xiamen University, China  
Yilun Ying, Nanjing University, China

## Information for Authors

Full details on how to submit material for publication in Analyst are given in the Instructions for Authors (available from <http://www.rsc.org/authors>). Submissions should be made via the journal's homepage: [rsc.li/analyst](http://rsc.li/analyst)

Authors may reproduce/republish portions of their published contribution without seeking permission from the Royal Society of Chemistry, provided that any such republication is accompanied by an acknowledgement in the form: (Original Citation)–Reproduced by permission of the Royal Society of Chemistry.

This journal is © The Royal Society of Chemistry 2023.

Apart from fair dealing for the purposes of research or private study for non-commercial purposes, or criticism or review, as permitted

under the Copyright, Designs and Patents Act 1988 and the Copyright and Related Rights Regulation 2003, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the Publishers or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency in the UK. US copyright law is applicable to users in the USA.

© The paper used in this publication meets the requirements of ANSI/NISO Z39.48–1992 (Permanence of Paper).

Registered charity number: 207890

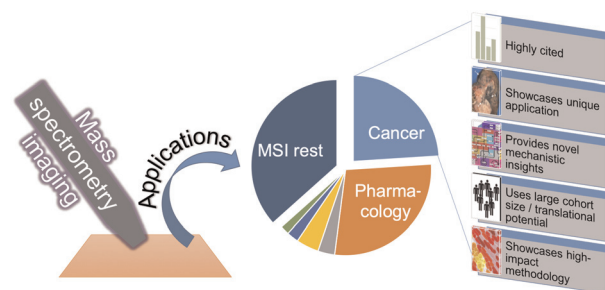


## CRITICAL REVIEWS

6161

## State-of-the-art mass spectrometry imaging applications in biomedical research

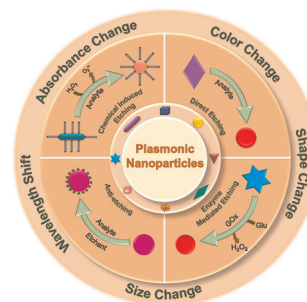
Kasper K. Krestensen, Ron M. A. Heeren and Benjamin Balluff\*



6188

## Plasmonic nanoparticle etching-based optical sensors: current status and future prospects

E. T. Athira and Jitendra Satija\*



## TUTORIAL REVIEW

6201

## Advances in the synthesis of heteroatom-doped graphene-based materials and their application in sensors, adsorbents and catalysis

Ziwei Xian, Yanmei Chen, Na Li and Tao Zhu\*

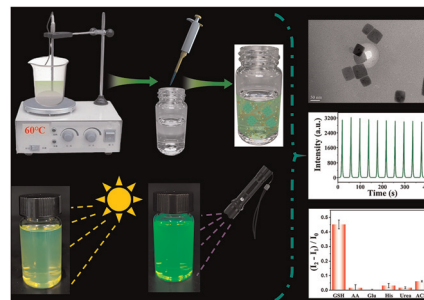


## COMMUNICATIONS

6223

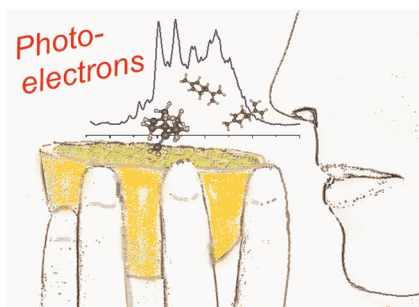
An improved ligand-assisted reprecipitation method to synthesize aqueous-phase CsPbBr<sub>3</sub> perovskite nanocrystals and investigate their electrochemiluminescence behavior

Xiaodong Luan, Shuochen Fan, Ke Xu, Haipeng Zhang, Xiaoyang Feng, Wenteng Zhang, Huaping Peng\* and Qile Li\*



## COMMUNICATIONS

6228

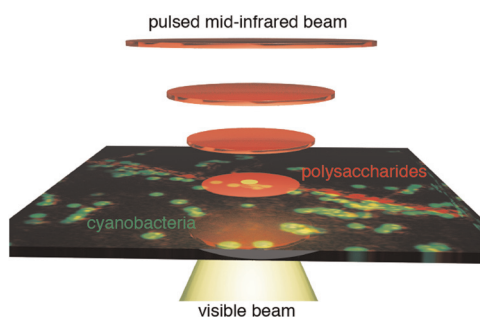


### Analysis of the volatile monoterpene composition of citrus essential oils by photoelectron spectroscopy employing continuously monitored dynamic headspace sampling

Hassan Ganjitarbar, Rim Hadidi, Gustavo A. Garcia, Laurent Nahon and Ivan Powis\*

## PAPERS

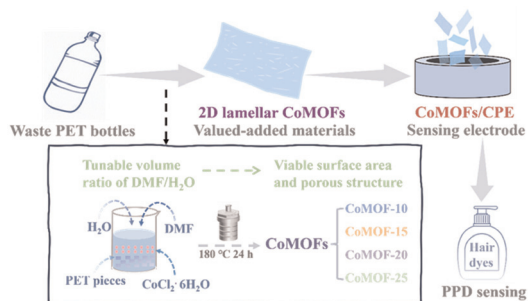
6241



### Label-free visualization of photosynthetic microbial biofilms using mid-infrared photothermal and autofluorescence imaging

Ryo Kato,\* Kaisei Maeda,\* Taka-aki Yano, Kan Tanaka and Takuo Tanaka

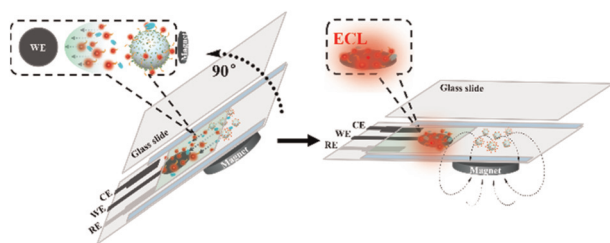
6248



### Co-based metal–organic frameworks synthesized from poly(ethylene terephthalate) waste plastics for rapid detection of *p*-phenylenediamine

Yanteng Xiao and Kangbing Wu\*

6253



### Disposable capillary-fill device for the determination of proteases incorporating elimination of light-shielding from the magnetic beads with cleavage of the electrogenerated chemiluminescence label-tagged peptide probe

Xiaolin Yang, Jie Li, Honglan Qi, Qiang Gao and Chengxiao Zhang\*

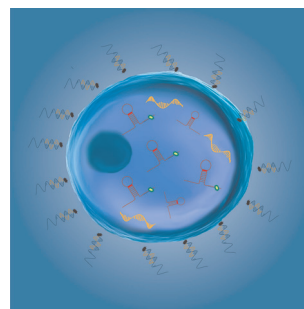


## PAPERS

6261

### Long non-coding RNA (lncRNA) MALAT1 in regulating osteogenic and adipogenic differentiation using a double-stranded gapmer locked nucleic acid nanobiosensor

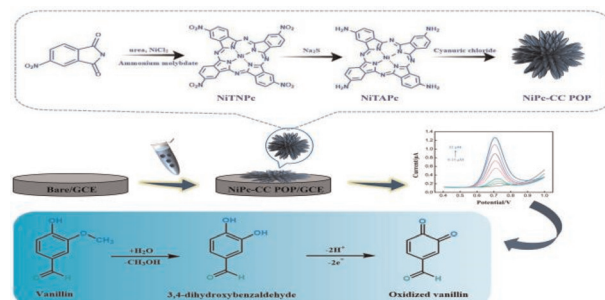
Samantha Fasciano, Shuai Luo and Shue Wang\*



6274

### Conductive phthalocyanine-based porous organic polymer as sensing platform for rapid determination of vanillin

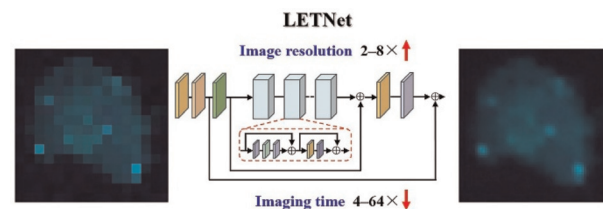
Gang Xiang, Wensi Xu, Wenfeng Zhuge, Qing Huang, Cuizhong Zhang and Jinyun Peng\*



6282

### Acceleration of high-quality Raman imaging via a locality enhanced transformer network

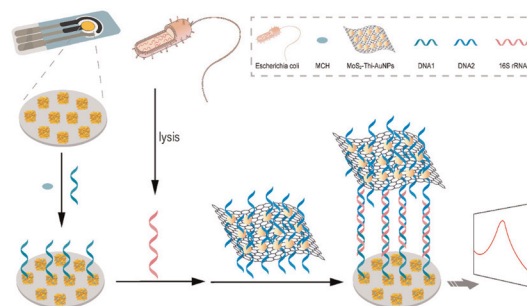
Shizhuang Weng,\* Rui Zhu, Yehang Wu, Cong Wang, Pan Li, Ling Zheng, Dong Liang\* and Zhangling Duan\*



6292

### Construction of a point-of-care electrochemical biosensor for *Escherichia coli* 16S rRNA analysis based on MoS<sub>2</sub> nanoprobe

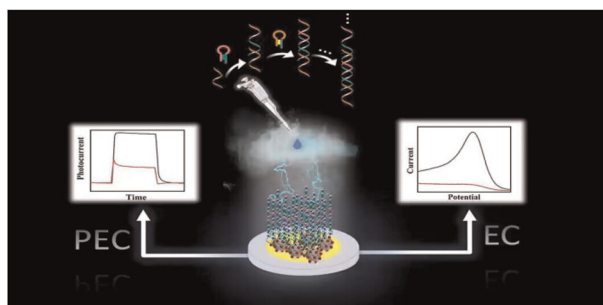
Lihui Yuwen, Xinyi Li, Liquan Wu, Yi Luo and Shao Su\*





## PAPERS

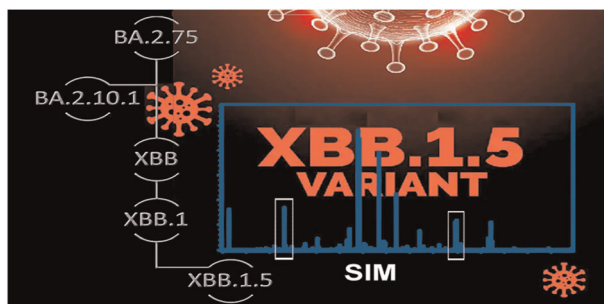
6297



### A dual-mode "signal-on" split-type aptasensor for bisphenol A via target-induced hybridization chain reaction amplification

You Wu, Zheng Wang, Jing Li, Jingjing Yang, Yinzhao Shen, Hongbo Li, Xiao-Ya Hu and Qin Xu\*

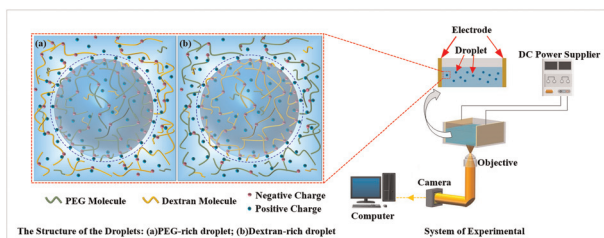
6306



### Distinguishing common SARS-CoV2 omicron and recombinant variants with high resolution mass spectrometry

Henry E. Lanyon, Benjamin P. Todd and Kevin M. Downard\*

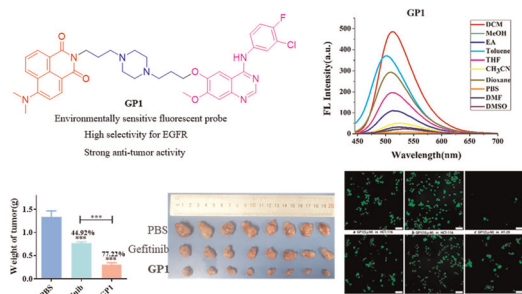
6315



### Surface charging and electrophoretic behavior of conductive polymer micro-droplets in conductive polymer liquid solutions

Deyu Li, Yongxin Song\* and Dongqing Li\*

6325



### Design, synthesis and biological evaluation of small molecule fluorescent probes targeting EGFR for tumor detection and treatment

Depu Song, Tengli Ding, Weibin Zhai, Lulian Shao, Ning Guo, Lei Jiang, Wei Zhang, Fenqin Zhao, Jianhong Wang, Junfeng Wang, Jing Ma\* and Lin Yan\*

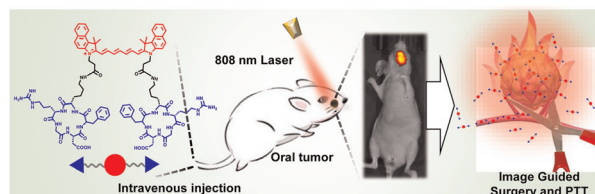


## PAPERS

6334

 **$\alpha\text{v}\beta 3$  integrin-targeted ICG-derived probes for imaging-guided surgery and photothermal therapy of oral cancer**

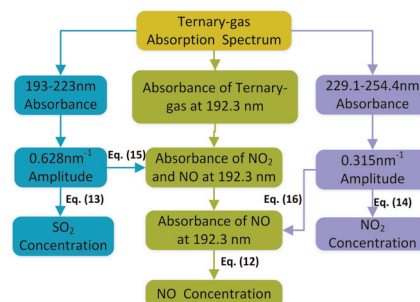
Changhe Men, Yuqi Zhang, Peiyang Shi, Zichun Tang\* and Xiaju Cheng\*



6341

**Quantitative analysis of  $\text{SO}_2$ ,  $\text{NO}_2$  and NO mixed gases based on ultraviolet absorption spectrum**

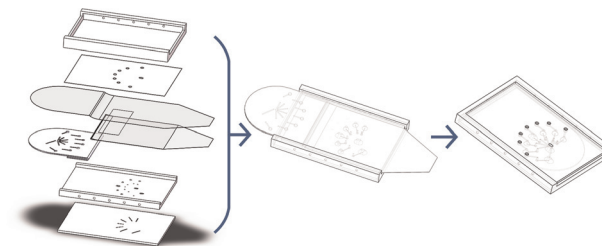
Yibiao Yang, Jinhuan Li, Zihui Zhang,\* Jianing Wang\* and Guanyu Lin



6350

**A film-linked electrostatic self-assembly microfluidic chip**

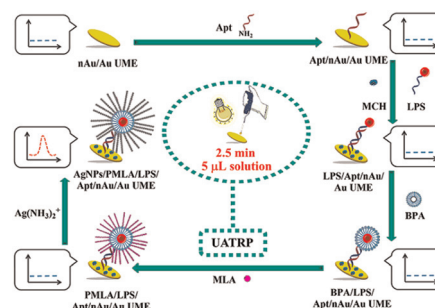
Gege Ding, Junsheng Wang,\* Yuezhu Wang, Chunxu Li, Runze Li, Jie Wen, Jianan Luo, Qiaochan Yu, Junhua Zhou and Xiongfei Geng

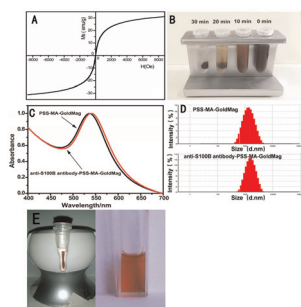


6359

**Ultramicro and ultrasensitive detection of lipopolysaccharides based on triple-signal amplification via ultrafast ATRP and an ultramicroelectrode**

Shipeng Jiang, Mingyang Sun, Peiran Meng, Xiaoyu Zhang and Yue Sun\*





## A biosensor for S100B detection based on PSS-MA-GoldMag-LFIA in early clinical diagnosis of brain damage

Xiaomei Zhang, Qinlu Zhang, Songdi Wu, Kai Hua\* and Yali Cui\*

