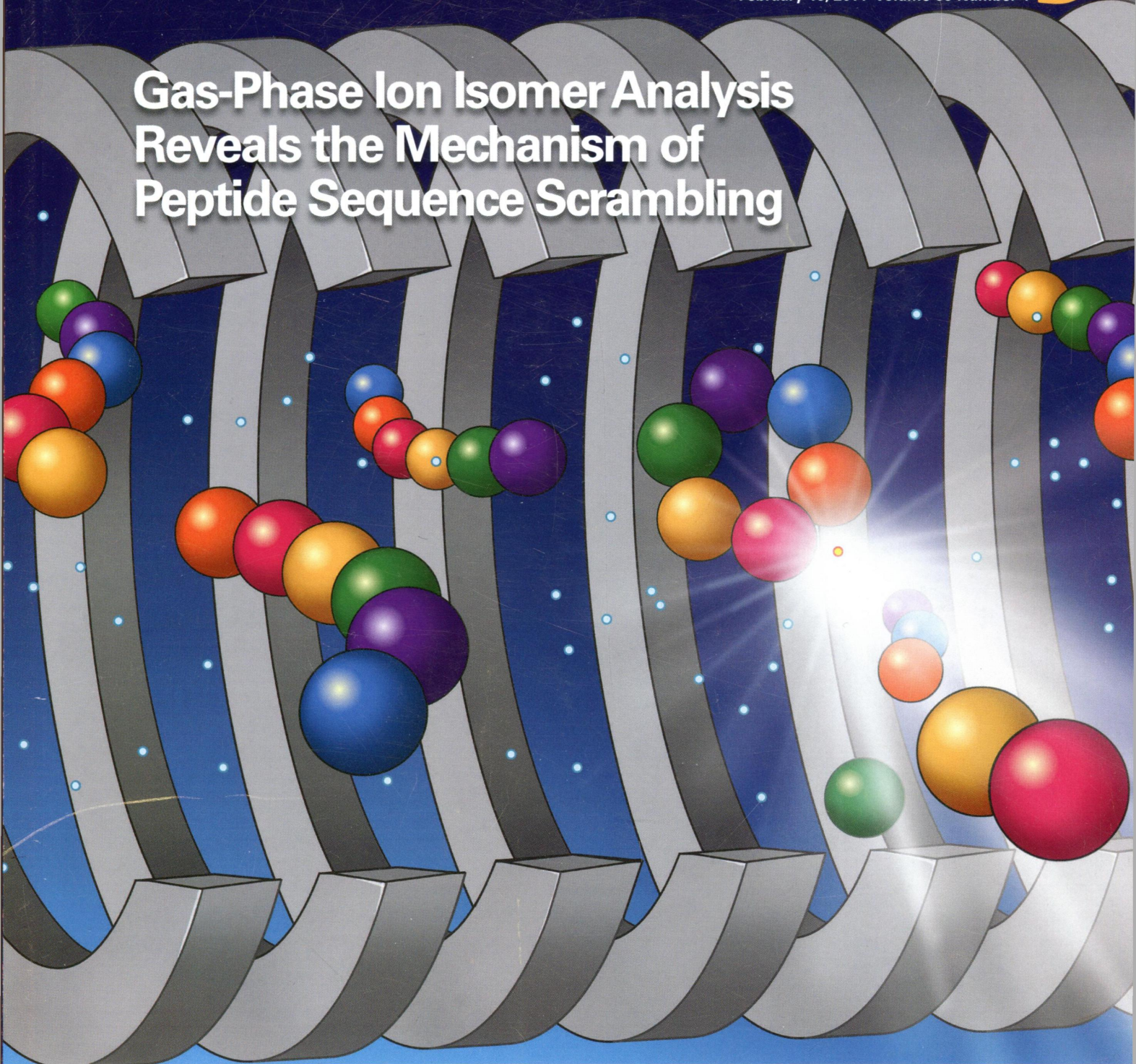


# analytical chemistry

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## Gas-Phase Ion Isomer Analysis Reveals the Mechanism of Peptide Sequence Scrambling



**ON THE COVER:** The cover illustrates that the peptide fragment isomers are separated by ion mobility spectrometry, and are also subjected to electron transfer dissociation producing characteristic fragments for identity assignments. Image created by S. Griffith-Oh.

## Letters to Analytical Chemistry

1927 **S**[dx.doi.org/10.1021/ac500028v](https://doi.org/10.1021/ac500028v)

**Reporter-Free Potentiometric Sensing of Boronic Acids and Their Reactions by Using Quaternary Ammonium Salt-Functionalized Polymeric Liquid Membranes**

Xuewei Wang, Dengfeng Yue, Enguang Lv, Lei Wu, and Wei Qin\*

## Technical Notes

1932 **S**[dx.doi.org/10.1021/ac403661z](https://doi.org/10.1021/ac403661z)

**Molecular Logic Gates on DNA Origami Nanostructures for MicroRNA Diagnostics**

Dongfang Wang, Yanming Fu, Juan Yan, Bin Zhao, Bin Dai, Jie Chao, Huajie Liu, Dannong He, Yi Zhang, Chunhai Fan, and Shiping Song\*

1937 **S**[dx.doi.org/10.1021/ac4037087](https://doi.org/10.1021/ac4037087)

**3-Aminoquinoline/*p*-Coumaric Acid as a MALDI Matrix for Glycopeptides, Carbohydrates, and Phosphopeptides**

Yuko Fukuyama,\* Natsumi Funakoshi, Kohei Takeyama, Yusaku Hioki, Takashi Nishikaze, Kaoru Kaneshiro, Shin-ichirou Kawabata, Shinichi Iwamoto, and Koichi Tanaka

1943 **S**[dx.doi.org/10.1021/ac403823d](https://doi.org/10.1021/ac403823d)

**Inductively Coupled Plasma Mass Spectrometry-Based Method for the Specific Quantification of Sulfenic Acid in Peptides and Proteins**

Ahmed H. El-Khatib, Diego Esteban-Fernández, and Michael W. Linscheid\*

1949 **S**[dx.doi.org/10.1021/ac404011z](https://doi.org/10.1021/ac404011z)


**Reaction-Based Azide Gas Sensing with Tailored Ionic Liquids Measured by Quartz Crystal Microbalance**

Ming-Chung Tseng and Yen-Ho Chu\*


1953 **S**[dx.doi.org/10.1021/ac4040218](https://doi.org/10.1021/ac4040218)

**On-Chip Separation and Analysis of RNA and DNA from Single Cells**


Hirofumi Shintaku, Hidekazu Nishikii, Lewis A. Marshall, Hidetoshi Kotera, and Juan G. Santiago\*

1958  [dx.doi.org/10.1021/ac4040345](https://doi.org/10.1021/ac4040345)  
**High-Pressure Open-Channel On-Chip Electroosmotic Pump for Nanoflow High Performance Liquid Chromatography**  
Wei Wang, Congying Gu, Kyle B. Lynch, Joann J. Lu, Zhengyu Zhang, Qiaosheng Pu,\* and Shaorong Liu\*


## Articles


1965  [dx.doi.org/10.1021/ac402550f](https://doi.org/10.1021/ac402550f)  
**Exploiting Enzyme Catalysis in Ultra-Low Ion Strength Media for Impedance Biosensing of Avian Influenza Virus Using a Bare Interdigitated Electrode**  
Yingchun Fu, Zachary Callaway, Jacob Lum, Ronghui Wang, Jianhan Lin, and Yanbin Li\*

1972 [dx.doi.org/10.1021/ac403901t](https://doi.org/10.1021/ac403901t)  
**Qualitative and Quantitative Characterization of Plasma Proteins When Incorporating Traveling Wave Ion Mobility into a Liquid Chromatography–Mass Spectrometry Workflow for Biomarker Discovery: Use of Product Ion Quantitation As an Alternative Data Analysis Tool for Label Free Quantitation**  
Charlotte E. Daly, Leong L. Ng, Amirmansoor Hakimi, Richard Willingale, and Donald J. L. Jones\*

1980  [dx.doi.org/10.1021/ac402742m](https://doi.org/10.1021/ac402742m)  
**pH-Switchable Electrochemical Sensing Platform based on Chitosan-Reduced Graphene Oxide/Concanavalin A Layer for Assay of Glucose and Urea**  
Yonghai Song, Hongyu Liu, Hongliang Tan, Fugang Xu, Jianbo Jia, Lixue Zhang, Zhuang Li, and Li Wang\*

1988  [dx.doi.org/10.1021/ac4027669](https://doi.org/10.1021/ac4027669)  
**Antibody-Free Detection of *Mycobacterium tuberculosis* Antigen Using Customized Nanotraps**  
Hung-Jen Wu, Yaojun Li, Jia Fan, Zaiyan Deng, Zhao Hu, Xuewu Liu, Edward A. Graviss, Mauro Ferrari, Xin Ma,\* and Ye Hu\*

1997  [dx.doi.org/10.1021/ac4031708](https://doi.org/10.1021/ac4031708)  
**Elucidating Redox-Level Dispersion and Local Dielectric Effects within Electroactive Molecular Films**  
Paulo R. Bueno\* and Jason J. Davis\*

2005  [dx.doi.org/10.1021/ac403026c](https://doi.org/10.1021/ac403026c)  
**Equipment-Free Quantitative Measurement for Microfluidic Paper-Based Analytical Devices Fabricated Using the Principles of Movable-Type Printing**  
Yun Zhang,\* Caibin Zhou, Jinfang Nie,\* Shangwang Le, Qun Qin, Fang Liu, Yuping Li, and Jianping Li

2013  [dx.doi.org/10.1021/ac403065v](https://doi.org/10.1021/ac403065v)  
**Improved Protein–Protein Interaction Assay FlimPIA by the Entrapment of Luciferase Conformation**  
Yuki Ohmuro-Matsuyama, Yuko Hara, and Hiroshi Ueda\*

- 2019  [dx.doi.org/10.1021/ac403153m](https://doi.org/10.1021/ac403153m)  
**Direct Observation of Differences of Carotenoid Polyene Chain *cis/trans* Isomers Resulting from Structural Topology**  
Emily R. Schenk, Vanesa Mendez, John T. Landrum, Mark E. Ridgeway, Melvin A. Park, and Francisco Fernandez-Lima\*
- 2025  [dx.doi.org/10.1021/ac403174e](https://doi.org/10.1021/ac403174e)  
**Accurate Nitric Oxide Measurements from Donors in Cell Media: Identification of Scavenging Agents**  
Jacqueline L. Harding and Melissa M. Reynolds\*
- 2033  [dx.doi.org/10.1021/ac4031779](https://doi.org/10.1021/ac4031779)  
**Electrostatic Spray Ionization Mass Spectrometry Imaging**  
Liang Qiao, Elena Tobolkina, Andreas Lesch, Alexandra Bondarenko, Xiaoqin Zhong, Baohong Liu, Horst Pick, Horst Vogel, and Hubert H. Girault\*
- 2042  [dx.doi.org/10.1021/ac4032516](https://doi.org/10.1021/ac4032516)  
**Tunable "Nano-Shearing": A Physical Mechanism to Displace Nonspecific Cell Adhesion During Rare Cell Detection**  
Ramanathan Vaidyanathan, Muhammad J. A. Shiddiky,\* Sakandar Rauf, Eloise Dray, Zhikai Tay, and Matt Trau\*
- 2050  [dx.doi.org/10.1021/ac403218f](https://doi.org/10.1021/ac403218f)  
**Heteronuclear NMR As a 4-in-1 Analytical Platform for Detecting Modification-Specific Signatures of Therapeutic Insulin Formulations**  
Xing Jin, Sunmi Kang, Hyuknam Kwon, and Sunghyouk Park\*
- 2057  [dx.doi.org/10.1021/ac403236q](https://doi.org/10.1021/ac403236q)  
**Highly Efficient Enrichment Method for Glycopeptide Analyses: Using Specific and Nonspecific Nanoparticles Synergistically**  
Yali Wang, Minbo Liu, Liqi Xie, Caiyun Fang, Huanming Xiong,\* and Haojie Lu\*
- 2065  [dx.doi.org/10.1021/ac4036789](https://doi.org/10.1021/ac4036789)  
**Logic Control of Enzyme-Like Gold Nanoparticles for Selective Detection of Lead and Mercury Ions**  
Chia-Wen Lien, Yu-Ting Tseng, Chih-Ching Huang,\* and Huan-Tsung Chang\*
- 2073  [dx.doi.org/10.1021/ac4036422](https://doi.org/10.1021/ac4036422)  
**Applications of Convolution Voltammetry in Electroanalytical Chemistry**  
Cameron L. Bentley, Alan M. Bond,\* Anthony F. Hollenkamp, Peter J. Mahon,\* and Jie Zhang
- 2082  [dx.doi.org/10.1021/ac403604j](https://doi.org/10.1021/ac403604j)  
**Carboxymethyl Cellulose Film as a Substrate for Microarray Fabrication**  
Yuri M. Shlyapnikov,\* Elena A. Shlyapnikova, and Victor N. Morozov

2090 [dx.doi.org/10.1021/ac403607s](https://doi.org/10.1021/ac403607s)

**Ion Permeability of the Nuclear Pore Complex and Ion-Induced Macromolecular Permeation as Studied by Scanning Electrochemical and Fluorescence Microscopy**

Jiyeon Kim, Anahita Izadyar, Mei Shen, Ryoichi Ishimatsu, and Shigeru Amemiya\*

2099 [dx.doi.org/10.1021/ac403636b](https://doi.org/10.1021/ac403636b)

**Developing New Isotope-Coded Mass Spectrometry-Cleavable Cross-Linkers for Elucidating Protein Structures**

Clinton Yu, Wynne Kandur, Athit Kao, Scott Rychnovsky, and Lan Huang\*

2107 [dx.doi.org/10.1021/ac4038448](https://doi.org/10.1021/ac4038448)

**Conformational Ordering of Biomolecules in the Gas Phase: Nitrogen Collision Cross Sections Measured on a Prototype High Resolution Drift Tube Ion Mobility-Mass Spectrometer**

Jody C. May, Cody R. Goodwin, Nichole M. Lareau, Katrina L. Leaprot, Caleb B. Morris, Ruwan T. Kurulugama, Alex Mordehai, Christian Klein, William Barry, Ed Darland, Gregor Overney, Kenneth Imatani, George C. Stafford, John C. Fjeldsted,\* and John A. McLean\*

2117 [dx.doi.org/10.1021/ac403716g](https://doi.org/10.1021/ac403716g)

**Highly Sensitive Electrochemical Methyltransferase Activity Assay**

Huimin Deng, Xinjian Yang, Stephanie Pei Xing Yeo, and Zhiqiang Gao\*

2124 [dx.doi.org/10.1021/ac4037262](https://doi.org/10.1021/ac4037262)

**Hybridization Chain Reaction Amplification of MicroRNA Detection with a Tetrahedral DNA Nanostructure-Based Electrochemical Biosensor**

Zhilei Ge, Meihua Lin, Ping Wang, Hao Pei, Juan Yan, Jiye Shi, Qing Huang, Dannong He, Chunhai Fan, and Xiaolei Zuo\*

2131 [dx.doi.org/10.1021/ac403735n](https://doi.org/10.1021/ac403735n)

**Oligomeric Cationic Polymethacrylates: A Comparison of Methods for Determining Molecular Weight**

Katherine E. S. Locock,\* Laurence Meagher, and Matthias Haeussler

2138 [dx.doi.org/10.1021/ac403796n](https://doi.org/10.1021/ac403796n)


**193 nm Ultraviolet Photodissociation Mass Spectrometry for the Structural Elucidation of Lipid A Compounds in Complex Mixtures**


John P. O'Brien, Brittany D. Needham, Jeremy C. Henderson, Emily M. Nowicki, M. Stephen Trent, and Jennifer S. Brodbelt\*

2146 [dx.doi.org/10.1021/ac403798q](https://doi.org/10.1021/ac403798q)


**Characterization and Quantification of Diacylglycerol Species in Biological Extracts after One-Step Derivatization: A Shotgun Lipidomics Approach**


Miao Wang, Jun Hayakawa, Kui Yang, and Xianlin Han\*

2156  [dx.doi.org/10.1021/ac403803a](https://doi.org/10.1021/ac403803a)  
**Data Dependent Peak Model Based Spectrum Deconvolution for Analysis of High Resolution LC-MS Data**  
Xiaoli Wei, Xue Shi, Seongho Kim, Jeffrey S. Patrick, Joe Binkley, Maiying Kong, Craig McClain, and Xiang Zhang\*


2166  [dx.doi.org/10.1021/ac403837r](https://doi.org/10.1021/ac403837r)  
**Urinary Metabolic Fingerprint of Acute Intermittent Porphyria Analyzed by  $^1\text{H}$  NMR Spectroscopy**  
Mickaël Carichon, Nicolas Pallet,\* Caroline Schmitt, Thibaud Lefebvre, Laurent Gouya, Neila Talbi, Jean Charles Deybach, Philippe Beaune, Paul Vasos, Hervé Puy, and Gildas Bertho\*


2175  [dx.doi.org/10.1021/ac403845u](https://doi.org/10.1021/ac403845u)  
**Development and Quantitative Evaluation of a High-Resolution Metabolomics Technology**  
Xiaojing Liu, Zheng Ser, and Jason W Locasale\*


2185  [dx.doi.org/10.1021/ac403859a](https://doi.org/10.1021/ac403859a)  
**Ultraviolet Photodissociation for Characterization of Whole Proteins on a Chromatographic Time Scale**  
Joe R. Cannon, Michael B. Cammarata, Scott A. Robotham, Victoria C. Cotham, Jared B. Shaw, Ryan T. Fellers, Bryan P. Early, Paul M. Thomas, Neil L. Kelleher, and Jennifer S. Brodbelt\*

2193  [dx.doi.org/10.1021/ac4038653](https://doi.org/10.1021/ac4038653)  
**Environment-Sensitive Fluorescent Supramolecular Nanofibers for Imaging Applications**  
Yanbin Cai, Yang Shi, Huaimin Wang, Jingyu Wang, Dan Ding, Ling Wang,\* and Zhimou Yang\*


2200 [dx.doi.org/10.1021/ac403868t](https://doi.org/10.1021/ac403868t)  
**Single-File Nanochannel Persistence Lengths from NMR**  
Muslim Dvovashkin, Hrishikesh Bhase, Navid Mirnazari, Sergey Vasenkov, and Clifford R. Bowers\*

2205  [dx.doi.org/10.1021/ac404004m](https://doi.org/10.1021/ac404004m)  
**Universal Surface-Enhanced Raman Scattering Amplification Detector for Ultrasensitive Detection of Multiple Target Analytes**  
Jing Zheng, Yaping Hu, Junhui Bai, Cheng Ma, Jishan Li, Yinhui Li, Muling Shi, Weihong Tan, and Ronghua Yang\*

2213  [dx.doi.org/10.1021/ac403877h](https://doi.org/10.1021/ac403877h)  
**Toward Functional Screening of Cardioactive and Cardiotoxic Drugs with Zebrafish *in Vivo* Using Pseudodynamic Three-Dimensional Imaging**  
Kuen-You Lin, Wei-Tien Chang, Yu-Cheng Lai, and Ian Liao\*


2221  [dx.doi.org/10.1021/ac403879d](https://doi.org/10.1021/ac403879d)  
**Fragment Formula Calculator (FFC): Determination of Chemical Formulas for Fragment Ions in Mass Spectrometric Data**  
André Wegner,\* Daniel Weindl, Christian Jäger, Sean C. Sapcariu, Xiangyi Dong, Gregory Stephanopoulos, and Karsten Hiller

2229  [dx.doi.org/10.1021/ac403968d](https://doi.org/10.1021/ac403968d)  
**Mixing in Colliding, Ultrasonically Levitated Drops**  
Edward T. Chainani, Woo-Hyuck Choi, Khanh T. Ngo, and Alexander Scheeline\*

2238  [dx.doi.org/10.1021/ac403974n](https://doi.org/10.1021/ac403974n)  
**Label-Free Detection of Native Proteins by Surface-Enhanced Raman Spectroscopy Using Iodide-Modified Nanoparticles**  
Li-Jia Xu, Cheng Zong, Xiao-Shan Zheng, Pei Hu, Jia-Min Feng, and Bin Ren\*

2246  [dx.doi.org/10.1021/ac404103r](https://doi.org/10.1021/ac404103r)  
**Highly Selective Enrichment of N-Linked Glycan by Carbon-Functionalized Ordered Graphene/Mesoporous Silica Composites**  
Nianrong Sun, Chunhui Deng,\* Yan Li,\* and Xiangmin Zhang

2251 [dx.doi.org/10.1021/ac4041795](https://doi.org/10.1021/ac4041795)  
**Impact of Protein Concentration on the Determination of Thiolic Groups of Ovalbumin: A Size Exclusion Chromatography–Chemical Vapor Generation–Atomic Fluorescence Spectrometry Study via Mercury Labeling**  
Beatrice Campanella, Massimo Onor, Alessandro D’Ulivo, Stefania Giannarelli, and Emilia Bramanti\*

2257  [dx.doi.org/10.1021/ac500142e](https://doi.org/10.1021/ac500142e)  
**Heterogeneous Reconstitution of the PQQ-Dependent Glucose Dehydrogenase Immobilized on an Electrode: A Sensitive Strategy for PQQ Detection Down to Picomolar Levels**  
Ling Zhang, Rebeca Miranda-Castro, Claire Stines-Chaumeil, Nicolas Mano, Guobao Xu, François Mavré,\* and Benoît Limoges\*

## Additions and Corrections

2268 [dx.doi.org/10.1021/ac500322c](https://doi.org/10.1021/ac500322c)  
**Correction to Surprising Effect of Uncompensated Resistance on the Cyclic Voltammetric Responses for a Reversible Surface-Confined and Uniformly Accessible Redox Couple**  
Stephen W. Feldberg

 Supporting Information available via online article