

# Journal of Electrochemistry

---

Volume 25  
Issue 2 *Special Issue: Electrochemical Analysis  
and Sensing (I)*

---

2019-04-28

## Electrochemical Analysis and Sensing Preface

Yi-tao LONG

Yang TIAN

---

### Recommended Citation

Yi-tao LONG, Yang TIAN. Electrochemical Analysis and Sensing Preface[J]. *Journal of Electrochemistry*, 2019 , 25(2): 139-140.

DOI: 10.13208/j.electrochem.181040

Available at: <https://jelectrochem.xmu.edu.cn/journal/vol25/iss2/1>

This Preface is brought to you for free and open access by Journal of Electrochemistry. It has been accepted for inclusion in Journal of Electrochemistry by an authorized editor of Journal of Electrochemistry.

DOI: 10.13208/j.electrochem.181040

Artical ID:1006-3471(2019)02-0139-02

Cite this: *J. Electrochem.* 2019, 25(2): 139-140

Http://electrochem.xmu.edu.cn

## 《电化学分析传感》专辑序言

龙亿涛<sup>1,2</sup>, 田 阳<sup>3</sup>

(1. 南京大学化学化工学院, 生命分析化学国家重点实验室, 南京 210023;

2. 华东理工大学化学与分子工程学院, 上海 200237; 3. 华东师范大学化学与分子工程学院, 上海 200241)

电化学分析传感是一种基于界面电荷相互作用的测量方法, 具有高灵敏、响应快、无标记等本征优势. 该方法的核心思路是将待测对象构建成为化学电池的某一部分, 通过测量界面电子转移或电荷重排过程中产生的电信号响应, 如电池电位、电流、电导、电量变化, 对待测目标进行定性定量动态地检测、监测或表征.

近年来, 伴随着测量仪器性能和数据处理方法的持续提高与优化, 电化学分析传感研究前沿热点越来越多地关注到纳米尺度界面上的瞬态电荷相互作用、动态电荷传输机制, 特别是发展限域空间内的单体纳米电化学信号放大、传输、记录、解析新模式和新策略. 其中, 单体电化学分析, 如单颗粒碰撞法等, 不仅可以得到常规宏观测量的单一平均结果, 同时还能描绘出所有不同颗粒结构与性能的完整分布, 揭示少量但关键的电化学活性位点和反应机理; 而纳米限域电化学分析, 如纳米孔道协同测量等, 则能通过限域效应有效延长亚稳态中间体的结构寿命, 灵敏识别不同待测单体间的细微理化性质差异及其动态变化过程. 此外, 电分析方法也更多地与谱学、成像等技术联用, 对界面电化学过程进行原位、实时、在线表征, 以期揭示纳米界面的电荷传递和能量转化的化学本质. 进而指导设计和构建高灵敏电化学传感器, 实现在疾病的早期检测、能源转换的高效率用、水体环境污染的有效治理等国家战略性新兴产业中的广泛应用.

本专辑围绕电化学分析传感新方法与新技术, 收录了在该研究领域具有丰富经验积累和影响力的团队所撰写的 21 篇相关研究进展的综述文章和研究论文(分成两期出版, 分别包含 10 篇和 11 篇). 希望借助此专辑的出版, 能使广大读者更好地了解当前电化学测量领域的研究现状、研究趋势和存在的问题及挑战, 推动我国下一代电化学精准分析技术和高效传感应用的进一步发展.

最后, 对本专辑的所有作者、审稿人及编辑部工作人员的辛勤工作和付出表示由衷的感谢!

# Electrochemical Analysis and Sensing

## Preface

Electrochemistry is the study of relationship between electricity and chemical effect. It deals with the interaction between electrical energy and chemical change, and electron transfer on electrode/electrolyte interfaces. As a type of measurement science, electrochemical analysis and sensing is to develop and apply electrochemical methods for qualitative or quantitative detection and monitoring. It is generally recorded the progress of reactions under an external applied bias, or the electrical signals caused by chemical processes, featuring advantages such as high sensitivity, fast response, label free, etc.

As one of the most critical approaches in analytical chemistry, electrochemical measurement has a very long history. Traditionally, the research focus was to develop modified electrodes for identification and quantification of analytes in an electrochemical cell by potentiometry, coulometry, or voltammetry. However, recently, an increasing amount of effort has been put to resolve mechanism of transient charge interaction and dynamic charge transfer, especially through the establishment of nanoconfined single-entity electrochemistry. Here, single entity methods, such as single nanoparticle electrochemistry, can effectively reveal the static and dynamic heterogeneity of real-world chemical systems that is commonly hidden in ensemble methods; while nanoconfinement enabled electroanalysis, such as nanopore measurements, can significantly prolonged lifetime of meta-stable intermediates, facilitating the recognition of tiny physiochemical difference of each individual as well as its dynamic motion and reaction. In addition, electroanalytical methods have also been extensively coupled with a wide range of spectroscopic and imaging techniques for *in situ*, *in operando* characterization of interfacial electrochemical events so as to resolve the intrinsic electron transfer and energy conversion on nanointerface. Such insights are then applied as guidance for the rational design and fabrication of high-performance electrochemical sensors.

We have collected 21 submissions including review and research articles from some leading research groups in electrochemical analysis and sensing in China. The submissions will be published in two issues, which include 10 and 11 submissions, respectively. We hope that the publication of this special issue helps the broad readers better understand the research status, future trends, problems and challenges of electrochemical measurements methods and techniques, and further promote the development of precision characterization and efficient sensors based on electrochemical approaches. We would like to take this opportunity to thank all the authors, reviewers, and editorial staffs of *Journal of Electrochemistry* for their excellent and professional contributions to this special issue.

Co-editors

Professor Dr. Yitao Long

State Key Laboratory of Analytical Chemistry for Life Science,  
School of Chemistry and Chemical Engineering, Nanjing University  
School of Chemistry & Molecular Engineering,  
East China University of Science and Technology

Professor Dr. Yang Tian

School of Chemistry and Molecular Engineering,  
East China Normal University