



ISSN 0567-7351
CN 31-1320/O6
CODEN HHHPA4
<http://sioc-journal.cn>

化学学报

ACTA CHIMICA SINICA

2017 第75卷 第11期 Vol. 75 No. 11

纳米传感分析专辑

Special Issue: Sensing at the Nanoscale

ISSN 0567-7351

11



中国化学会
中国科学院上海有机化学研究所

主办

化学学报

Acta Chimica Sinica

(Huaxue Xuebao)

第 75 卷 第 11 期 2017 年 11 月 15 日

目 次

社论

纳米传感器 龙亿涛, 樊春海, 化学学报, **2017**, 75(11), 1021-1022

研究展望

基于热电材料的新型传感器研究进展
..... 柳冈, 王铁*, 化学学报, **2017**, 75(11), 1029-1035

综述

纳米等离子体生物传感及成像
..... 苏莹莹, 彭天欢, 邢菲菲, 李迪*, 樊春海*, 化学学报, **2017**, 75(11), 1036-1046
纳米荧光探针用于核酸分子的检测及成像研究
..... 杨立敏, 刘波, 李娜*, 唐波*, 化学学报, **2017**, 75(11), 1047-1060
基于光学显微术的单粒子传感
..... 王咏婕, 王伟*, 化学学报, **2017**, 75(11), 1061-1070
基于纳米多孔薄膜光学干涉的光学传感器
..... 王亚锋, 杨倩, 苏彬*, 化学学报, **2017**, 75(11), 1071-1081

研究通讯

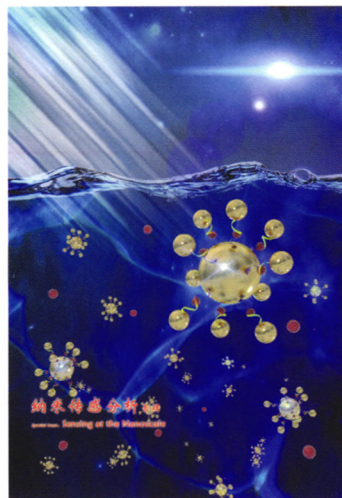
纳米电极稳态电流表征的探讨
..... 马慧, 马巍, 杨哲曜, 丁志峰, 龙亿涛*, 化学学报, **2017**, 75(11), 1082-1086
纳米孔道单分子检测结直肠癌 MicroRNAs
..... 胡正利, 杜冀晖, 应佚伦, 彭岳一, 曹婵, 龙亿涛*, 化学学报, **2017**, 75(11), 1087-1090

研究论文

光致清洁电极可见光在线更新与细胞实时监测
..... 度欢欢, 刘艳玲, 王雅文, 汤匀, 黄卫华*, 化学学报, **2017**, 75(11), 1091-1096
基于等离子体耦合效应的高灵敏汞离子传感器
..... 钱广盛, 赵微*, 徐静娟*, 陈洪渊, 化学学报, **2017**, 75(11), 1097-1102
基于 G-四链体模板的银纳米簇共振能量转移比率检测 miRNA
..... 林若韵, 陈阳, 陶广宇, 裴晓静, 刘锋, 李娜*, 化学学报, **2017**, 75(11), 1103-1108
基于铜-巯基配位聚合物电化学催化的新型乙酰胆碱酯酶电化学传感器
..... 王琴, 聂舟*, 胡宇芳*, 姚守拙, 化学学报, **2017**, 75(11), 1109-1114
利用交流阻抗传感技术实时监测纳米沟槽上皮肤细胞的定向行为
..... 金桐宇, 安宇, 张帆*, 何品刚*, 化学学报, **2017**, 75(11), 1115-1120
固态纳米孔对蛋白质易位的实验研究
..... 沙菁翌*, 徐冰, 陈云飞, 杨颜菁, 化学学报, **2017**, 75(11), 1121-1125

* 通信联系人.

On the cover: High-intensive Rayleigh light scattering of Core-satellite Au nanostructure is applied in highly sensitive Hg^{2+} detection based on Hg^{2+} -induced AuNPs assembly. The detection limit of Hg^{2+} concentration can reach a level of picomole in the absence of any amplification strategies. [Xu, Jingjuan *et al.* on page 1097-1102.]



Editorial

Nanosensors

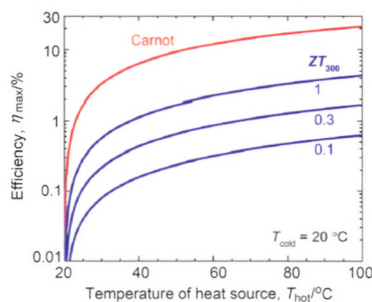
Long, Yitao; Fan, Chunhai *Acta Chim. Sinica* **2017**, 75(11), 1021-1022

Perspective

Research Progress in Thermoelectric Materials for Sensor Application

Liu, Gang; Wang, Tie*

Acta Chim. Sinica **2017**, 75(11), 1029-1035



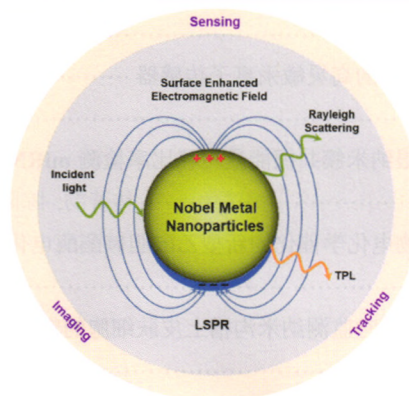
This perspective shows the carnot efficiency (red) and maximum efficiency η_{Max} of a thermoelectric leg (blue) with increasing heat source temperature T_{hot} (the heat sink is kept at $T_{\text{cold}} = 20\text{ }^{\circ}\text{C}$).

Review

Nanoplasmonic Biological Sensing and Imaging

Su, Yingying; Peng, Tianhuan; Xing, Feifei; Li, Di*; Fan, Chunhai*

Acta Chim. Sinica **2017**, 75(11), 1036-1046

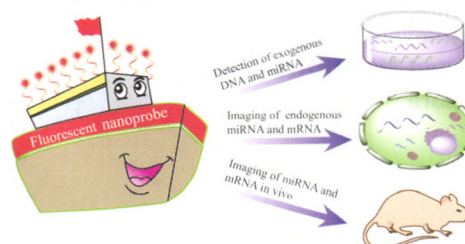


The localized surface plasmon resonance of metal nanoparticles is the collective oscillation of electrons on particle surface, which can be utilized for the development of new biosensing, tracking and bioimaging applications.

Fluorescent Nanoprobe for Detection and Imaging of Nucleic Acid Molecules

Yang, Limin; Liu, Bo; Li, Na*; Tang, Bo*

Acta Chim. Sinica **2017**, 75(11), 1047-1060

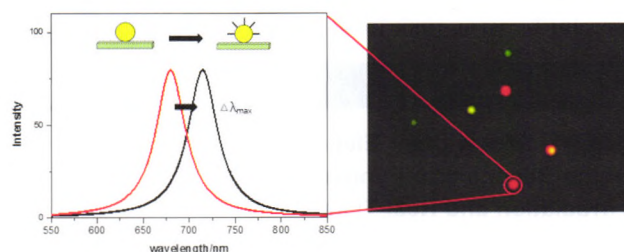


It is of great significance to develop accurate and effective methods for detecting nucleic acid molecules, which are closely associated with the occurrence and development of multiple diseases. We illustrated the advances in the development of fluorescent nanoprobe for detection of disease-related DNA, mRNA and miRNA in live cells and *in vivo* in recent years.

Single Nanoparticle Sensing Based on Optical Microscopy

Wang, Yongjie; Wang, Wei*

Acta Chim. Sinica **2017**, 75(11), 1061-1070

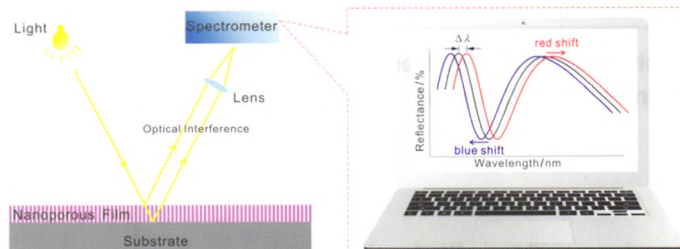


Single nanoparticle sensing (SNS) is an emerging research field. Varied kinds of optical microscopy are applied to locating the nano-sensor, and to accessing and analyzing the optical signal it reports. SNS has excellent sensitivity and allows for high-throughput and multiplex analysis. Moreover, it can be easily introduced to microscopic and dynamic systems to probe specific analytes with high temporal and spatial resolution. In this review, we summarize recent progresses in SNS in the past five years, and provide our opinions on its further developments.

Optical Sensors Based on Optical Interference of Nanoporous Film

Wang, Yafeng; Yang, Qian; Su, Bin*

Acta Chim. Sinica **2017**, 75(11), 1071-1081



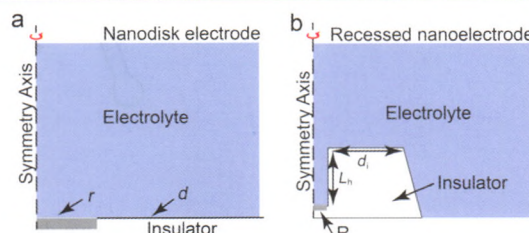
Molecules entering or leaving from the nanoporous film would cause the change of refractive index of nanoporous film, resulting in the red or blue shift of the corresponding reflectometric interference spectrum. In this review, the recent progress of optical interference based optical sensors was fully discussed and a perspective for their future development was also included.

Communication

Characterization of Steady-State Current at Nanoelectrodes

Ma, Hui; Ma, Wei; Yang, Zheyao; Ding, Zhifeng; Long, Yi-Tao*

Acta Chim. Sinica **2017**, 75(11), 1082-1086



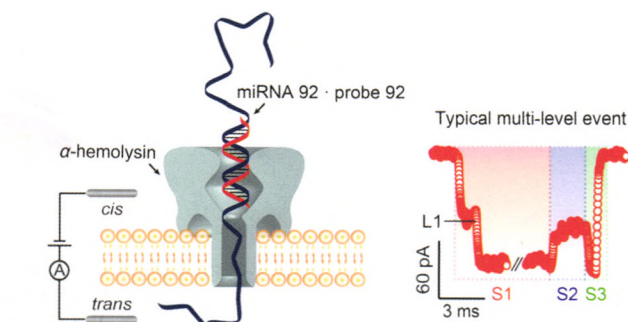
To interpret the interdependence of the electrode geometry and the steady-state current responses, electrochemical experiments and finite-element simulations based on 2D axisymmetric model by COMSOL were performed to characterize the nanodisk electrodes and recessed nanoelectrodes. Our findings offer an understanding on the relationship between the nanoelectrode performance and the electrode geometry, which can provide insight into their electrochemical behaviors.

Single-Molecule Analysis of Colorectal Cancer-associated MicroRNAs via a Biological Nanopore

Hu, Zhengli; Du, Jihui; Ying, Yilun; Peng, Yueyi; Cao, Chan; Long, Yi-Tao*

Acta Chim. Sinica **2017**, 75(11), 1087-1090

Article

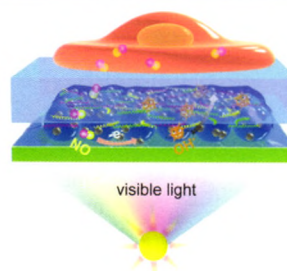


A special probe 92 was designed, consisting of a poly(dT)₄₀ signal tag at either end and a response element in the middle section which can be well-matched with the colorectal cancer-associated miRNA 92. When a single miRNA 92-probe 92 complex molecule traversing across the α -hemolysin nanopore confined space, typical multi-level event was observed, permitting identification of miRNA 92.

Photocatalytically Renewable Electrode for On-Line Regeneration under Visible Light Irradiation and Real-Time Monitoring of Living Cells

Duo, Huanhuan; Liu, Yanling; Wang, Yawen; Tang, Yun; Huang, Weihua*

Acta Chim. Sinica **2017**, 75(11), 1091-1096

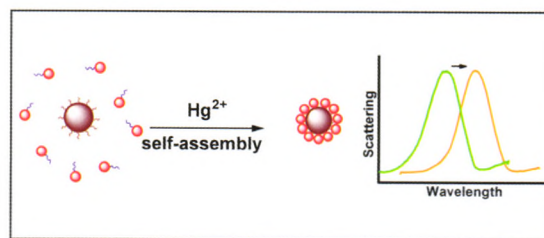


We developed a renewable electrode by the combination of gelatin hydrogel gelatin, PEDOT and photocatalysts TiO₂/CdS nanocomposite, and this electrochemical sensor can realize efficient electrode self-cleaning under visible light irradiation during the culture and detection of living cells.

Highly Sensitive Detection of Mercury Ion Based on Plasmon Coupling

Qian, Guangsheng; Zhao, Wei*; Xu, Jingjuan*; Chen, Hongyuan

Acta Chim. Sinica **2017**, 75(11), 1097-1102

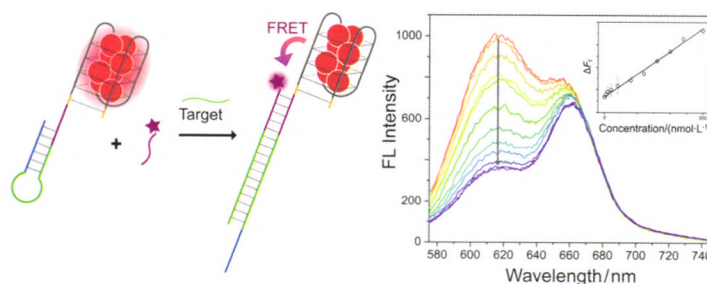


A novel strategy for sensitive detecting of mercury ion based on Rayleigh light scattering spectroscopy of Hg²⁺-induced core-satellites Au nanostructure.

FRET-based Ratiometric MicroRNA Detection with G-quadruplex-stabilized Silver Nanoclusters

Lin, Ruoyun; Chen, Yang; Tao, Guangyu; Pei, Xiaojing; Liu, Feng; Li, Na*

Acta Chim. Sinica **2017**, 75(11), 1103-1108

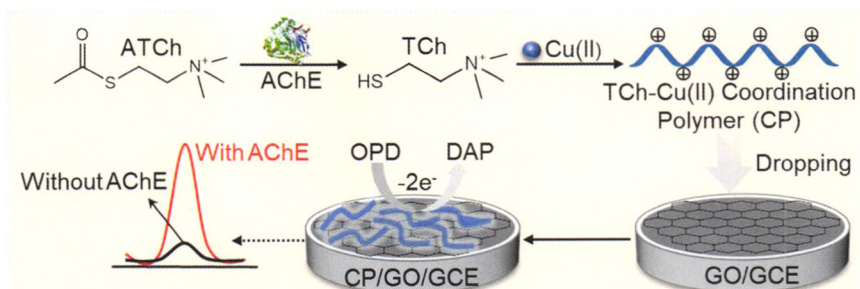


In this work, we developed a ratiometric miRNA detecting method exploiting the FRET probe consisting of a highly emissive GQ-Ag NC donor and a Cy5 tag acceptor. The introduction of the target miRNAs brings the FRET pair into close proximity and thus facilitates the energy transfer. The ΔF_1 value of the FRET probe was used to determine the concentration of the miRNA to reduce the variation brought by detecting instruments and conditions. The linear range and the detection limit of this method was 12~300 nmol/L and 6.9 nmol/L, respectively.

Electrochemical Assay for Acetylcholinesterase Activity Detection Based on Unique Electro-catalytic Activity of Cu(II)-thiol Coordination Polymer

Wang, Qin; Nie, Zhou*; Hu, Yufang*; Yao, Shouzhao

Acta Chim. Sinica **2017**, 75(11), 1109-1114

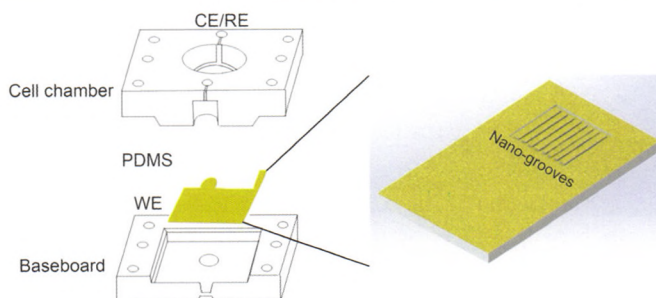


Acetylcholinesterase (AChE) can rapidly hydrolyze acetylthiocholine (ATCh) into thiocholine (TCh), which can react with Cu(II) to form the TCh-Cu(II) coordination polymer (CP). Desired by it, we developed a novel and reliable electrochemical biosensor for high sensitive and selective detection of AChE activity and its inhibitor screening.

Real-time Monitoring Skin Cell Alignment on Nano-grooves Using Electric Cell-substrate Impedance Sensing (ECIS)

Jin, Tongyu; An, Yu; Zhang, Fan*; He, Pingang*

Acta Chim. Sinica **2017**, 75(11), 1115-1120

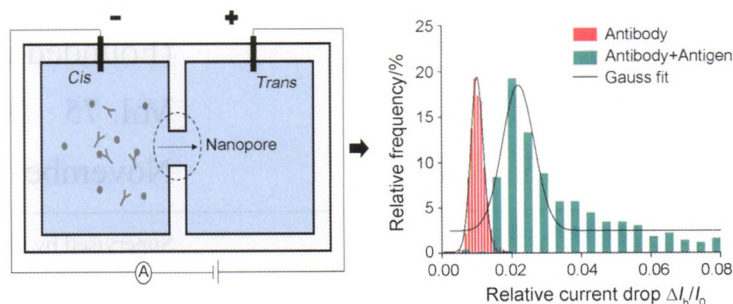


Schematic presentation of the ECIS device, composed of cell chamber, Pt gauze as reference electrode/counter electrode (RE/CE), PDMS sealing layer, the fabricated nano-grooves as working electrode (WE) and baseboard.

Experimental Research of Protein Translocation Using Solid-state Nanopore

Sha, Jingjie*; Xu, Bing; Chen, Yunfei; Yang, Yanjing

Acta Chim. Sinica **2017**, 75(11), 1121-1125



The Si_3N_4 membrane drilled with a nanopore separated the buffer solution into two sides: *cis* and *trans*. When the voltage applied into the buffer solution, charged proteins would be driven through the pore. In this paper, we using solid-state nanopore detected single protein and protein-protein complexes. Both the applied voltage and the pH of the electrolyte solution were regulated. Further, the antibody and antigen-antibody complexes could be distinguished.



- Peer-reviewed
- High quality and standard
- Founded in 1933
- First SCI indexed Chemistry journal in China
- Free for reviewing and publishing
- Open access
- High efficiency in reviewing and publishing



Editor-in-Chief

ZHOU Qi-Lin(周其林)
Nankai University

Associate Editors

DING Kui-Ling(丁奎岭)

Shanghai Institute of Organic Chemistry, CAS

GAO Song(高松)

Peking University

HE Chuan(何川)

University of Chicago, USA

JIANG Gui-Bin(江桂斌)

Research Center for Eco-Environmental Sciences, CAS

LIU Zhong-Fan(刘忠范)

Peking University

ZHANG Xi(张希)

Tsinghua University

SHUAI Zhi-Gang(帅志刚)

Tsinghua University

