บทความที่น่าสนใจประจำเดือนกรกฎาคม 2558
สาขาวิทยาศาสตร์และเทคโนโลยี

1	Title:	Simultaneous detection of multiple bioactive pollutants using a multiparametric biochip for water quality monitoring
	Author:	Christian Guijarro, Karen Fuchs, Ulrich Bohrn, Evamaria Stütz, Stefan Wölfl
	Journal:	Biosensors and Bioelectronics, Volume 72, 15 October 2015, Pages 71–79
	Abstract:	Water is a renewable resource but yet finite. Its sustainable usage and the maintenance of a good quality are essential for an intact environment, human life and a stable economy. Emerging technologies aim for a continuous monitoring of water quality, overcoming periodic analytical sampling, and providing information on the current state of inshore waters in real time. So does the here presented cell-based sensor system which uses RLC-18 cells (rat liver cells) as the detection layer for the detection of water pollutants. The electrical read-out of the system, cellular metabolism, oxygen consumption and morphological integrity detects small changes in the water quality and indicates a possible physiological damage caused. A generalized functional linear model was implemented in order to regress the chemicals present in the sample on the electrical read-out. The chosen environmental pollutants to test the system were chlorpyrifos, an organophosphate pesticide, and tetrabromobisphenol A, a flame retardant. Each chemical gives a very characteristic response, but the toxicity is mitigated if both chemicals are present at once. This will focus our attention on the statistical approach which is able to discriminate between these pollutants.
	Database:	ScienceDirect

2	Title:	An aptameric graphene nanosensor for label-free detection of small-molecule biomarkers
	Author:	Cheng Wang, Jinho Kim, Yibo Zhu, Jaeyoung Yang, Gwan-Hyoung Lee, Sunwoo Lee, Jaeeun Yu, Renjun Pei, Guohua Liu, Colin Nuckolls, James Hone, Qiao Lin
	Journal:	Biosensors and Bioelectronics, Volume 71, 15 September 2015, Pages 222–229
	Abstract:	This paper presents an aptameric graphene nanosensor for detection of small-molecule biomarkers. To address difficulties in direct detection of small molecules associated with their low molecular weight and electrical charge, we incorporate an aptamer-based competitive affinity assay in a graphene field effect transistor (FET), and demonstrate the utility of the nanosensor with dehydroepiandrosterone sulfate (DHEA-S), a small-molecule steroid hormone, as the target analyte. In the competitive affinity assay, DHEA-S specifically binds to aptamer molecules pre-hybridized to their complementary DNA anchor molecules immobilized on the graphene surface. This results in the competitive release of the strongly charged aptamer from the DNA anchor and hence a change in electrical properties of the graphene, which can be measured to achieve the detection of DHEA-S. We present experimental data

	on the label-free, specific and quantitative detection of DHEA-S at clinically appropriate concentrations with an estimated detection limit of 44.7 nM, and analyze the trend observed in the experiments using molecular binding kinetics theory. These results demonstrate the potential of our nanosensor in the detection of DHEA-S and other small molecules in biomedical applications.
Database:	ScienceDirect

3	Title:	Hemoglobin detection using carbon dots as a fluorescence probe
	Author:	Ali Barati, Mojtaba Shamsipur, Hamid Abdollahi
	Journal:	Biosensors and Bioelectronics, Volume 71, 15 September 2015, Pages 470–475
	Abstract:	Herein, we have described the application of high fluorescent carbon dots (CDs) without any surface modification as a simple and fast responding fluorescence probe for sensitive and selective determination of hemoglobin (Hb) in the presence of H2O2. Although Hb itself was able to quench the fluorescence of CDs, based on the inner filter effect (IFE) of the protein that affects both excitation and emission spectra of CDs, the presence of H2O2 resulted in further improvement of the sensitivity of Hb detection. The assay is based on the reaction of Hb with H2O2 that generates reactive oxygen species including hydroxyl (View the MathML sourceOH•) and superoxide (View the MathML sourceO2•−) radicals under heme degradation and/or iron release from Hb and the subsequent reaction of hydroxyl radicals, as strong oxidizing agents, with CDs resulting in high fluorescence quenching. The proposed probe was used for determination of Hb in concentration range of 1–100 nM with a detection limit of 0.4 nM. The method was successfully applied to the determination of Hb in human blood samples.
	Database:	ScienceDirect

4	Title:	Poly(arlyene ether sulfone) based semi-interpenetrating polymer network membranes containing cross-linked poly(vinyl phosphonic acid) chains for fuel cell applications at high temperature and low humidity conditions
	Author:	Kihyun Kim, Pilwon Heo, Taeyun Ko, Ki-hyun Kim, Sung-Kon Kim, Chanho Pak, Jong-Chan Lee
	Journal:	Journal of Power Sources, Volume 293, 20 October 2015, Pages 539–547
	Abstract:	Semi-interpenetrating polymer network (semi-IPN) membranes are prepared by in-situ casting and thermal-initiated radical polymerization of vinyl phosphonic acid (VPA) and bis(2-(methacryloyloxy)ethyl) phosphate (BMAEP) in N,N-dimethylacetamide solutions of sulfonated poly(arylene ether sulfone) (SPAES). The incorporation of VPA units into the SPAES membranes improves proton conductivity especially at high temperature and low humidity conditions. In addition the cross-linker, BMAEP, prevents the decrease of the mechanical and chemical stabilities by the aliphatic linear poly(vinyl phosphonic acid) chains in the semi-IPN membranes, and furthermore the phosphonic acid group in BMAEP can prevent the decrease of the proton conductivity by the formation

		of cross-linked structures. Therefore, the resulting semi-IPN membranes show high proton conductivities up to 15 mS cm−1 at 120 °C and 40% RH. The fuel cell performance (187 mW cm−2 at 120 °C and 40% RH) of membrane-electrode assembly (MEA) from the semi-IPN membrane is found to be superior to that (145 mW cm−2 at 120 °C and 40% RH) of MEA from the SPAES membrane. The durability test result at the operating conditions indicates that the semi-IPN membrane is electrochemically very stable maintaining the low hydrogen cross-over and high power densities.
	Database:	ScienceDirect

5	Title:	Double-layer gas diffusion media for improved water management in polymer electrolyte membrane fuel cells
	Author:	Yongqiang Wang, Liang Wang, Suresh G. Advani, Ajay K. Prasad
	Journal:	Journal of Power Sources, Volume 292, 1 October 2015, Pages 39–48
	Abstract:	Water management is an important consideration to improve the performance of polymer electrolyte membrane fuel cells (PEMFCs). Reactant gases are supplied to the catalyst layer through gas diffusion media (GDM) in PEMFCs. Under high current draw conditions, the GDM can flood with liquid water which is detrimental to fuel cell operation. In this paper, we investigate the effectiveness of a double-layer GDM with different polytetrafluoroethylene (PTFE) loadings to mitigate saturation with liquid water under flooding conditions. We developed a numerical model to predict the saturation field in the double-layer GDM, and showed that the overall saturation level is decreased when the layer with higher PTFE loading is placed adjacent to the catalyst layer. It was found that the interface between the two GDM layers plays a significant role in regulating the saturation level by lowering the driving saturation level for water transport inside the GDM. The numerical predictions of the model were validated by conducting experiments with the double-layer GDM which showed a higher limiting current density and more stable performance, thereby confirming that the new GDM architecture can improve water management in PEMFCs.
	Database:	ScienceDirect

6	Title:	Electrochemical properties of carbon from oil palm kernel shell for high performance supercapacitors
	Author:	Izan Izwan Misnon, Nurul Khairiyyah Mohd Zain, Radhiyah Abd Aziz, Baiju Vidyadharan, Rajan Jose
	Journal:	Electrochimica Acta, Volume 174, 20 August 2015, Pages 78–86
	Abstract:	Electrochemical properties of activated carbon (AC) derived from oil palm kernel shell (PKS) are evaluated and compared with other biomass derived AC for fabricating high performance electrochemical double layer capacitors (EDLC). Cleaned PKS are carbonized by pyrolysis and subsequently activated by physical and chemical methods. The chemically AC show a wider pore distribution (1.4–9.3 nm) whereas the physically activated one has uniform pores (1.5 nm). The

		electrochemical properties of the two types of AC are evaluated using cyclic voltammetry (CV), charge–discharge cycling (CDC) and electrochemical impedance spectroscopy (EIS) in three-electrode configuration. High specific capacitance (CS) (210 F g−1 in 1 M KOH electrolyte at 0.5 A g−1) is obtained for chemically AC whereas the CS for the physically AC is 50% lower (123 F g−1). Galvanostatic CDC tests show that the electrodes maintained ∼95–97% of CS after 1000 cycles. The EIS revealed that the PKS AC has low series resistance (< 0.6 Ω) and relaxation time (∼0.69 s) which would therefore offers high power density in the EDLC devices.
	Database:	ScienceDirect

7	Title:	A simple model for charge storage in a nanotube
	Author:	Wolfgang Schmickler
	Journal:	Electrochimica Acta, Volume 173, 10 August 2015, Pages 91–95
	Abstract:	We consider a narrow nanotube in contact with an ionic liquid; the sizes of the ions are supposed to be so different that only one kind of ion can enter the tube. For a given number of N equal ions in the tube, the distance between the ions is determined by Coulomb repulsion. Using results obtained previously from density functional theory, we calculate the energy of an ensemble of equal ions, including vibrations about the equilibrium positions. For large tubes, in the thermodynamic limit, the resulting capacity diverges at zero charge for entropic reasons. It then increases rapidly, passes through a maximum, and becomes smaller as the distance between the ions decreases with increasing charge. Small nanotubes exhibit discrete charging steps reminiscent of quantum dots.
	Database:	ScienceDirect

8	Title:	Dielectric relaxations in starch-water solutions
	Author:	Clement Yadem, Tapani Repo, Raimo Silvennoinen
	Journal:	Electrochimica Acta, Volume 171, 20 July 2015, Pages 42–48
	Abstract:	We demonstrate the effect of water-soluble starch on an electrochemical impedance spectrum with the aim of sensing starch concentration in an aqueous solution. The characteristic form of the relative dielectric dispersion curves with respective loss factors was shown to relate to the severity of the starch concentration at a frequency range from 200 Hz up to 500 kHz. It was also remarkable to recognize that even in a lower frequency regime, for instance from 0.1 Hz up to 200 Hz, the spectral peaks in the dispersion curves of the dielectric loss factors were observable with separate consecutive relaxation times. According to the results of this study, this clearly demonstrates the reliability of these features when estimating the concentration of starch in aqueous starch solutions.
	Database:	ScienceDirect

9	Title:	Synthesis, biological and electrochemical evaluation of novel nitroaromatics as potential anticancerous drugs
	Author:	Muhammad Shabbir, Zareen Akhter, Iqbal Ahmad, Safeer Ahmed, Hammad Ismail, Bushra Mirza, Vickie Mckee, Michael Bolte
	Journal:	Bioelectrochemistry, Volume 104, August 2015, Pages 85–92
	Abstract:	Nitroaromatics i.e. 1-nitro-4-phenoxybenzene (1), 4-(4-nitrophenyloxy) biphenyl (2), 1-(4-nitrophenoxy) naphthalene (3) and 2-(4-nitrophenoxy) naphthalene (4) were synthesized by Williamson etherification and characterized by elemental analysis, FTIR, NMR (1H, 13C), UV–visible spectroscopy, mass spectrometry and single crystal X-ray diffraction analysis. Their brine shrimp cytotoxicity resulted in LD50 values < 1 μg/mL indicating significant antitumor activity with IC50 values ranging from 29.0 to 8.4 μg/mL. They are highly active in protecting DNA against hydroxyl free radicals in a concentration dependent manner. Voltammetric studies showed one electron reversible reduction at a platinum electrode with diffusion coefficient (Do) values of the order ~ 10− 6–10− 7 cm2 s− 1. Strong interaction with the human blood DNA through intercalative mode was contemplated through electrochemical and UV–visible spectroscopic studies which are in agreement with the conclusions drawn from biological analysis, unravelling the potential anticancerous nature of the synthesized compounds.
	Database:	ScienceDirect

10	Title:	Stability, redox parameters and electrocatalytic activity of a cytochrome domain from a new subfamily
	Author:	María F. Molinas, Leandro Benavides, María A. Castro, Daniel H. Murgida
	Journal:	Bioelectrochemistry, Volume 105, October 2015, Pages 25–33
	Abstract:	We report a spectroscopic, electrochemical and spectroelectrochemical characterization of the soluble cytochrome c domain (Cyt-D) from the Rhodothermus marinus caa3 terminal oxygen reductase and its putative electron donor, a high potential [4Fe–4S] protein (HiPIP). Cyt-D exhibits superior stability, particularly at the level of the heme pocket, compared to archetypical cytochromes in terms of thermal and chemical denaturation, alkaline transition and oxidative bleaching of the heme, which is further increased upon adsorption on biomimetic electrodes. Therefore, this protein is proposed as a suitable building block for electrochemical biosensing. As a proof of concept, we show that the immobilized Cyt-D exhibits good electrocatalytic activity towards H2O2 reduction. Relevant thermodynamic and kinetic electron transfer parameters for Cyt-D and HiPIP are also reported, including reorganization energies of 0.33 eV and 0.42 eV, respectively.
	Database:	ScienceDirect