J Biosens Bioelectron 2015, 6:3
http://dx.doi.org/10.4172/2155-6210.C1.025

OMICS International
conferenceseries.com

Ultra long-discharge-time bio-battery based on bilayer rolled-up enzymatic nano-membrane

Bo Liu
IFW, Germany

The development of electronics such as implantable computing, biosensor and medical equipment demands new energy resources which would be utilized in the human body safely and stably with high energy and capacity densities, which is a major challenge for the present battery technology. Glucose, as a natural product, is produced in a huge quantity every year in the plant. In glucose molecule storage high energy could be released by enzymes. Glucose Bio-Fuel Cell (GBFC) produces electricity through catalyzing glucose by enzyme. GBFC is powered by glucose and enzyme. Glucose exists also in animal fluids, such as human blood (Glucose level 6.3 mM and 4.5 L blood). That means we can get energy from our blood. The enormous challenge of GBFC is to improve the power density and discharge time. Because enzymes for this reaction are *in vivo* enzymes and they are sensitive to pH, temperature and some ions. It is challenge to keep the activity of enzymes out of the cell, to reach high catalysis ability. We designed a new GBFC based on bilayer rolled-up nano-membrane electrode, to ensure a high activity of enzyme and to reach a continuous catalysis of enzyme, to solve the problem in the previous research. We expect a higher power density and ultra long continuous discharge time in the research.

b.liu@ifw-dresden.de

A magnetoresistive biochip platform and its bioanalytical applications

Fernandes E[1], Martins V C[2], Dias T[1], Germano J[2], Cardoso F A[2], Sobrino T[3], Cardoso S[2] and **Freitas P P[1,2]**
[1]I International Iberian Nanotechnology Laboratory, Portugal
[2]INESC-MN, Portugal
[3]University of Santiago de Compostela, Spain

Cancer, stroke and cardiovascular diseases are excellent examples of large public health problems requiring an early detection system that led scientific communities focus their interests on the biosensing area. Integrated spintronic biochip platforms are being developed for point of care (POC) diagnostic/prognostic applications. Here we report a biochip platform comprising 30 spin-valve (SV) sensors separated in six groups of 4 bioactive sensors plus a reference sensor. This platform join all the advantages of a magnetoresistive based biochip sensitivity, fast response, no signal interference with the possibility to perform an integrated sample pretreatment (separation, labelling and amplification) in a miniaturized, portable, lab on a chip electronically assisted platform. This work presents the potential of this technology on different bioanalytical applications reported in several publications (e.g. proteins, pathogens, DNA identification and polymorphism), emphasizing a multiplex detection system that has being performed to detect a panel of biomarkers present in human serum to predict brain ischemia. Our detection strategy is based on multiple "sandwich" immunoassays over the chip area. The biological targets are initially labelled in serum by using antibody anchored magnetic nanoparticles (MNPs) of 250 nm and loaded through microfluidics onto an array of SV sensors, where the specific probes (antibodies) are immobilized. Upon probe/target recognition, and a washing step to remove unspecifically bound biomolecules, the final immobilized target is quantified. The full assay takes around 45 minutes. Calibration curves are being established to define the detection limits for each of the six stroke's biomarkers, and we have reached the minimum detection limit of 4 μg/mL for Fibronectin, which is in accordance with the cutoff value defined for stroke patients. Taking the advantages of the magnetic attraction that allows concentrating the target over the probe sites, limits of detection in the nanogram range are further expected.

elisabete.fernandes@inl.int