The 28th European Conference on Solid-State Transducers

EUROSENSORS 2014

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GUIDEBOOK

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A4P-G Biological Sensors and Biomedical Devices and Systems

Time: Monday, September 8, 2014, 16:30 - 18:30
Place: Poster Area
Chair(s): Gerald Urban, *University of Freiburg, Freiburg (Germany)*
Francisco J. Arregui, *Public University of Navarre, Pamplona (Spain)*

A4P-G01 Bioconjugation of Heavy Metal-Binding Proteins on Surface: an Optical and Gravimetric Characterization

Jane Politi, Alessandro Calio', Principia Dardano, Mario Iodice, Ilaria Rea, Luca De Stefano
IMM-NA CNR, Italy

A4P-G02 Duplicate Analysis of Cortisol for Stress Check Using QCM with a Self"suction Flow System

Takeshi Ito[1], Nobuyoshi Aoki[1], Wakako Shinobu[3], Koji Suzuki[2]
[1]Kanagawa Industrial Technology Center, Japan; [2]Keio University, Japan; [3]NDK Co., Ltd., Japan

A4P-G03 Glucose Biosensor Based on the Hexacyanoferrate 11-Mercaptoundecil-N',N'',N'''-trimethylammonium/6-(Ferrocenyl)hexanethiol

Thaisa Baldo, Patricia Seraphim, Homero Gomes, Marcos F.S. Teixeira
Sao Paulo State University (UNESP), Brazil

A4P-G04 Designing Efficient Localized Surface Plasmon Resonance-Based Sensing Platforms for Direct Detection of Hydrogen Sulfide

Meisam Omidi, Gh. Amoabediny, F. Yazdian
University of Tehran, Iran

A4P-G05 Assessment of Burn Depths on Organs by Microwave

Matthieu Brusson[1], Jérome Rossignol[1], Stéphane Binczak[3], Gabriel Laurent[3], Brice de Fonseca[2]
[1]GERM Dpt Nanosciences, Laboratoire Interdisciplinaire Carnot de Bourgogne UMR CNRS 6303, France; [2]GERM Dpt Nanosciences, Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR CNRS 6303, France; [3]Laboratoire Electronique Informatique et Image UMR

A4P-G06 A New Low Power Instrument for Impedance Measurements in Biomedicine Based on FFT, Application to Interleukin-10 Protein Detection

Francisco Palacio[1], Joan Daniel Prades[1], Manel Lopez[1], José María Gómez[1], Abdelhamid Errachid[2]
[1]Univ. Barcelona, Spain; [2]Univ. Lyon 1, France

A4P-G07 Development of an Electrochemical Aptasensor for the Detection of Human Osteopontin

Sofia Meirinho[1], Luis Dias[2], Antonio Peres[3], Ligia Rodrigues[1]
[1]CEB-University of Minho, Portugal; [2]CIMO-IPB, Portugal; [3]LSRE-IPB, Portugal

Development of an Electrochemical Aptasensor for the Detection of Human Osteopontin

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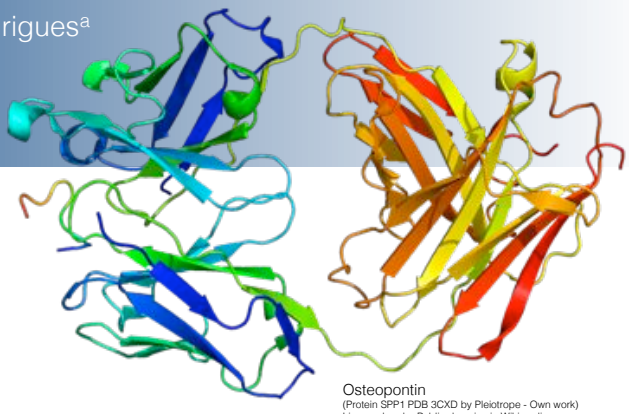

Osteopontin
(Protein SPP1 PDB 3CXD by Pleiotrope - Own work)
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INTRODUCTION

Electrochemical aptasensors

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Detection of protein biomarkers related to tumour activity

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Recombinant human osteopontin (rhOPN), a possible biomarker of breast cancer progression

OBJECTIVE

Electrochemical RNA aptasensor

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To obtain bio-sensor with high affinity for rhOPN aiming to be used for cancer prognosis

MATERIALS AND METHODS

RNA aptamer details

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Isolated by SELEX process [1]

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Sequence of the biotinylated RNA aptamer:

5'-Biotin- CGGCCACAGAAUGAAAAACCUCAUCGAUGUUGCAUAGUUG-3'

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Removal the interference of Rnase
Working RNA aptamer solution 4 nM in PBS.

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RNA aptamer immobilization on a gold surface

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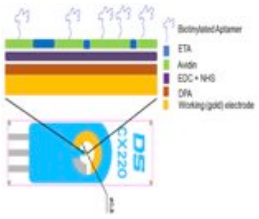
via streptavidin-biotin interaction



Cyclic voltammetry analysis

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Room temperature
Potentiostat-Galvanostat device (Uniscan)

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Screen-printed electrodes chip (DropSens):
- gold working electrode
- silver reference electrode
- gold counter electrode

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rhOPN standard solutions in PBS (25 to 1600 nM)

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1 hour of incubation

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$[Fe(CN)6]^{-3/-4}$ solution (redox probe)

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Cyclic voltammograms:
- −0.5 to 0.6 V
- scan rate = 50 mV/s

RESULTS

Aptamer–rhOPN electrochemical signals

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Different rhOPN concentrations
Monitoring with $[Fe(CN)6]^{-3/-4}$

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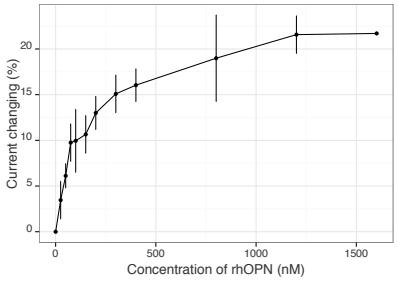
Current decreases with increasing rhOPN concentration
Signal-off sensing mechanism (dynamic concentration range from 0 to 1600 nM)



Calibration curve

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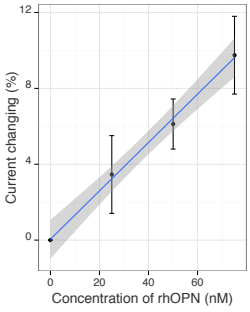
Linear relationship for [rhOPN] <100 nM
- Detection limit = 8 nM
- Quantification limit = 24 nM



Protein interference evaluation

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DRAWBACK: aptasensor not fully specific for rhOPN

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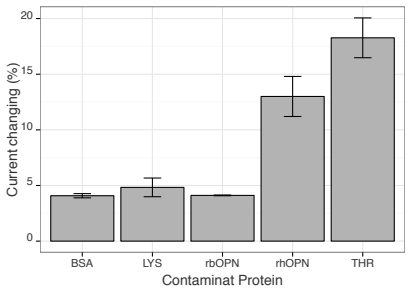
Interferences of other proteins:
- (–) Bovine serum albumin (BSA)
- (–) Lysozyme (LYS)
- (–) Recombinant bovine OPN (rbOPN)
- (+) Thrombin (THR)



CONCLUSIONS

Preliminary results show that the proposed electrochemical aptasensor is:
- a simple and sensitive tool for detection of rhOPN
- not totally specific for rhOPN
- new aptamers against rhOPN needed to improve its detection performance and selectivity.

[1] Z. Mi, H. Guo, M. B. Russell, Y. Liu, B. A. Sullenger, P. C. Kuo, RNA aptamer blockade of osteopontin inhibits growth and metastasis of MDA-MB231 breast cancer cells, Molecular Therapy, 17 (2009) 153–61

Acknowledgements
This work was partially co-financed by FCT and FEDER under Program COMPETE (Project PEst-C/EQB/LA0020/2013); by the Strategic Project PEst-OE/EQB/LA0023/2013 and by the project ref. RECI/BBB-EBI/0179/2012 (project number FCOMP-01-0124-FEDER-027462) funded by Fundação para a Ciência e a Tecnologia.