Poster N°: P02

Optimization of the aptamers' immobilization conditions for maximizing the response of a dual-aptasensor for cancer biomarker detection

Sofia G. Meirinho[a], Maha Ezzedine[b,c], Ana C.A. Veloso[d,e], Luís G. Dias[b,f], Lígia R. Rodrigues[e], Ali Othmane[g], António M. Peres[a]

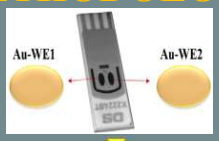
[a]*Associate Laboratory LSRE-LCM, ESA, Instituto Politécnico de Bragança, Bragança, Portugal;* [b]*ESA, Instituto Politécnico de Bragança, Bragança, Portugal;* [c]*ISBM, Université de Monastir, Monastir, Tunisia;* [d]*Instituto Politécnico de Coimbra, ISEC, DEQB, Coimbra, Portugal;* [e]*CEB - Centre of Biological Engineering, University of Minho, Braga, Portugal;* [f]*CQ-VR – Centro de Química – Vila Real, University of Trás-os-Montes, Vila Real, Portugal;* [g]*Laboratory of Interfaces and Advanced Materials, Faculty of Medecine of Monastir, University of Monastir, Monastir, Tunisia*

INTRODUCTION

A simple and sensitive method that allows the simultaneous detection of single or multiple cancer biomarkers is envisaged and may be an important tool in cancer diagnosis. Osteopontin (OPN) is a protein that is present in several body fluids and has been reported as a possible cancer biomarker. The voltammetric signals generated by the dual-aptasensor array, after the formation of the aptamers-protein complex, were monitored using cyclic voltammetry (CV) and square-wave voltammetry (SWV), using $[Fe(CN)_6]^{-3/-4}$ as a redox probe. The aim of this work is to optimize the experimental conditions to development a label-free voltammetric dual-aptasensor array for the detection of human osteopontin using a 2^k factorial experimental design.

METHODOLOGY

Dual-SPGE

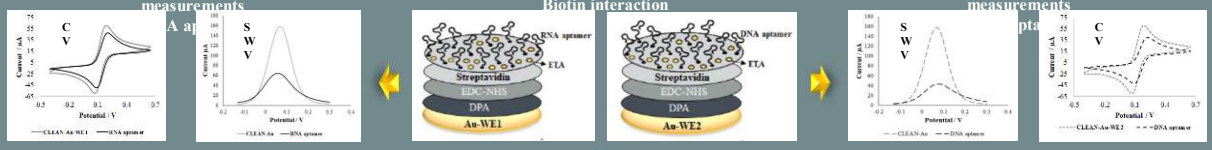


Cleanin

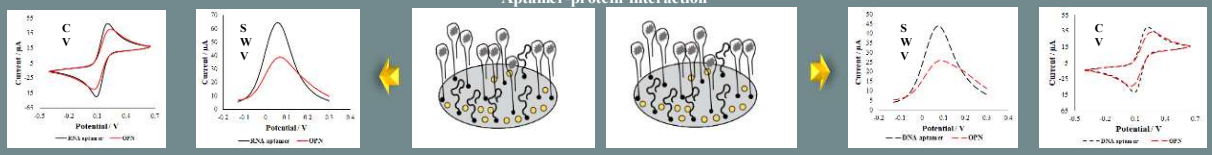
Electrochemical measurements

Aptamer immobilization by Streptavidin-Biotin interaction

Electrochemical measurements

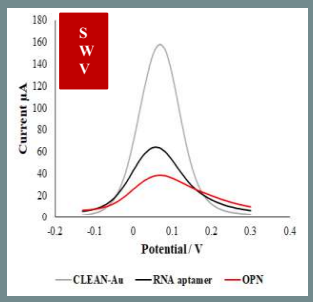


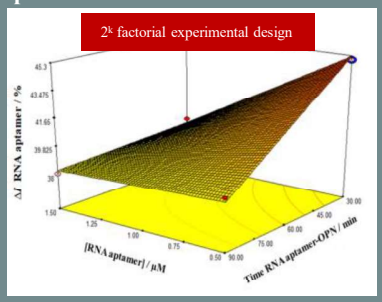
Aptamer-protein interaction



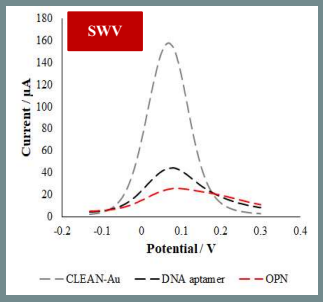
RESULTS

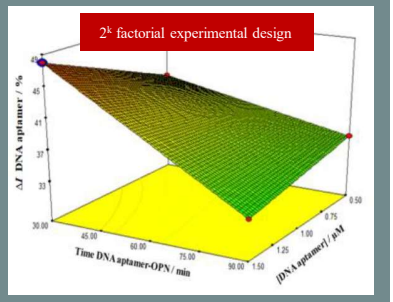
RNA aptamer





DNA aptamer





CONCLUSIONS

RNA aptamer	Conditions	DNA aptamer
0.5	Aptamer concentration / µM	1.5
20	Time aptamer immobilization / min	20
30	Time aptamer-protein interaction / min	30
4	Temperature / °C	4
45	Current change relative, ΔI swv / %	48

ΔI (%) = (I_0 - I_1) / I_0 x 100, where ΔI is the relative current change (%), I_0 and I_1 represents the peak current before and after the sample incubation, respectively.

Acknowledgements: This work was financially supported by Project POCI-01–0145-FEDER-006984 – Associate Laboratory LSRE-LCM, Project UID/QUI/00616/2013 – CQ-VR, and of UID/BIO/04469/2013 - CEB all funded by FEDER - Fundo Europeu de Desenvolvimento Regional through COMPETE2020 - Programa Operacional Competitividade e Internacionalização (POCI) – and by national funds through FCT - Fundação para a Ciência e a Tecnologia, Portugal. S.G. Meirinho also acknowledges the research grant provided by Project UID/EQU/50020/2013.