INTEGRATION OF THE MICROFLUIDIC AND PLASTIC BODY FOR THE DETECTION OF A BIOMARKER ASSOCIATED WITH ALZHEIMER DISEASE

Inês Vinagre[1*] Stefano Chiussi[2*] and Felismina T. C. Moreira[1*]

[1]CIETI - LabRISE-School of Engineering, Polytechnic of Porto, R. Dr. António Bernardino de Almeida, 431, 4249-015 Porto, Portugal;
[2]CINTECX , Universidade de Vigo, New Materials Group, Vigo, 36310, Spain.
*Email: imdsv@isep.ipp.pt, ftm@isep.ipp.pt,schiussi@uvigo.gal.

INTRODUCTION

Alzheimer disease

55 million people live with dementia worldwide

Increased levels of total Tau protein

Treatment

Lab tests
Mental/physical exams

SOLUTION

MIP technology using gold screen-printing electrodes (Au-SPE) modified with an electroactive polymer (poly-methylene blue) to detect the Tau-441 protein at the point-of-care (PoC).

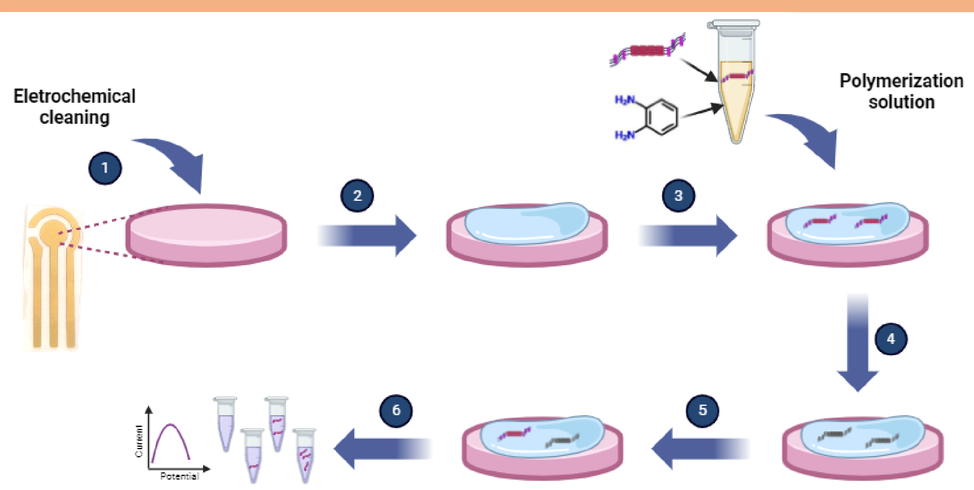
Imprinting phase
Monomer orto-phenylenediamine was electropolymerized in the presence of the target protein tau on the working electrode (WE) of the modified Au-SPE.

Analytical performance
Evaluated by impedance spectroscopy (EIS) with Bugger. The sensor assembly was monitored by cyclic voltammetry (CV), EIS and FTIR.

The protein was detected in the concentration range of 0.004 ng/ml-400ng/mL, with an R^2 of 0,9864

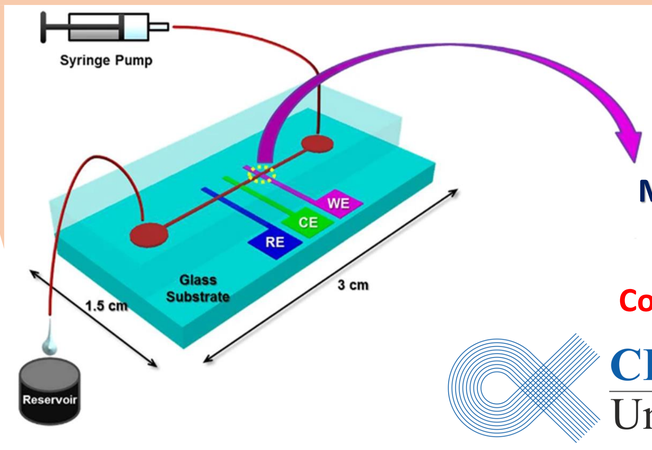
Microfluidic Plataform

METHODOLOGY



Schematic representation of a MIP for the detection of the TAU- 441 protein: **(1)** Pre-treatment in working electrode; **(2)** methylene blue (MB) electropolymerization; **(3)** electropolymerization of a solution containing Tau- 441 protein and ortho-phenylenediamine monomer ; **(4)** TAU-441 protein removal from polymer matrix; **(5)** template binding on the MIP surface; **(6)** Analytical performance of the sensor with different concentrations of TAU-441 solutions.

FUTURE PERSPECTIVE



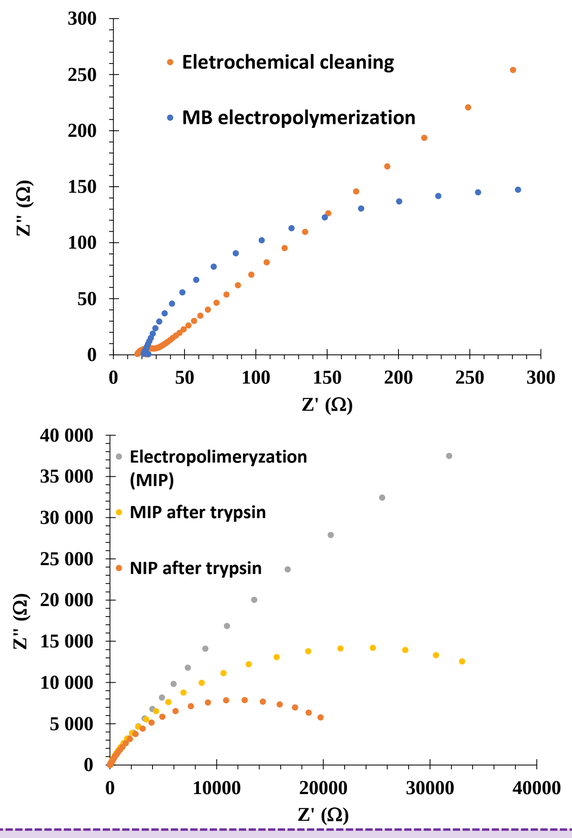
Microfluidic plataform

Cooperation

CINTECX Universidade de Vigo

RESULTS

Electrochemical assembly of the Tau-441 biosensor



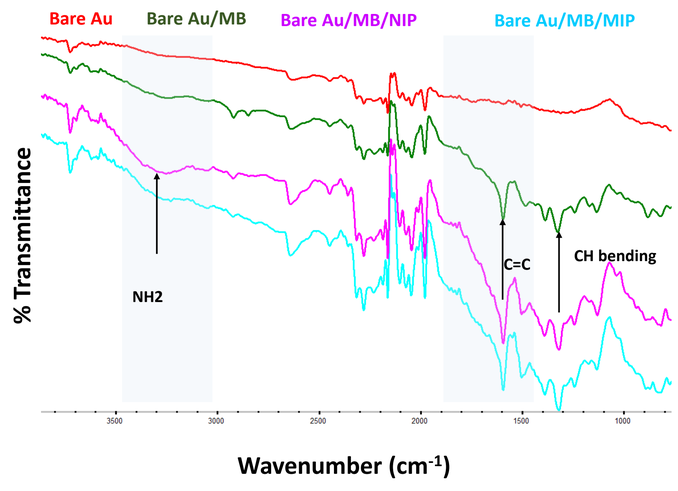
Electrochemical technique

Impedance spectroscopy

Z'' (Ω) Decrease after trypsin

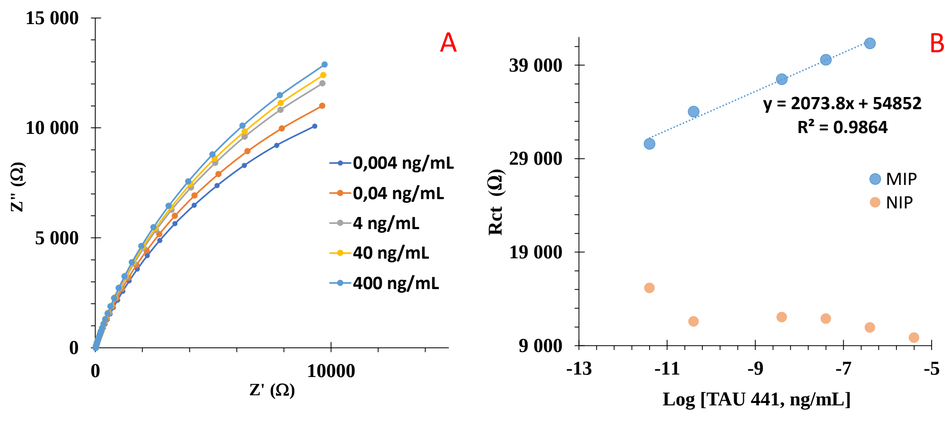
The target molecule is removed from the polymer matrix when it comes into contact with trypsin. Thus, printed cavities are formed.

Surface modification characterization



✓**The FTIR spectra were taken at all stages of surface modification.**

Analytical performance of the biosensor



MIP

✓**Higher sensitivity**

✓**Low detection limit**

✓**Response over the concentration range 0.004 ng/mL-400 ng/mL**

Calibration of the Tau-441 protein biosensor (A) ; (B) Calibration curve for MIP and NIP at different concentrations prepared with buffer solution (PBS, DTT and glycerin).

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