

Smart Materials: Sensing by “Fitting” and “Imprinting” based on aptamer and molecularly imprinted polymers (MIPs)

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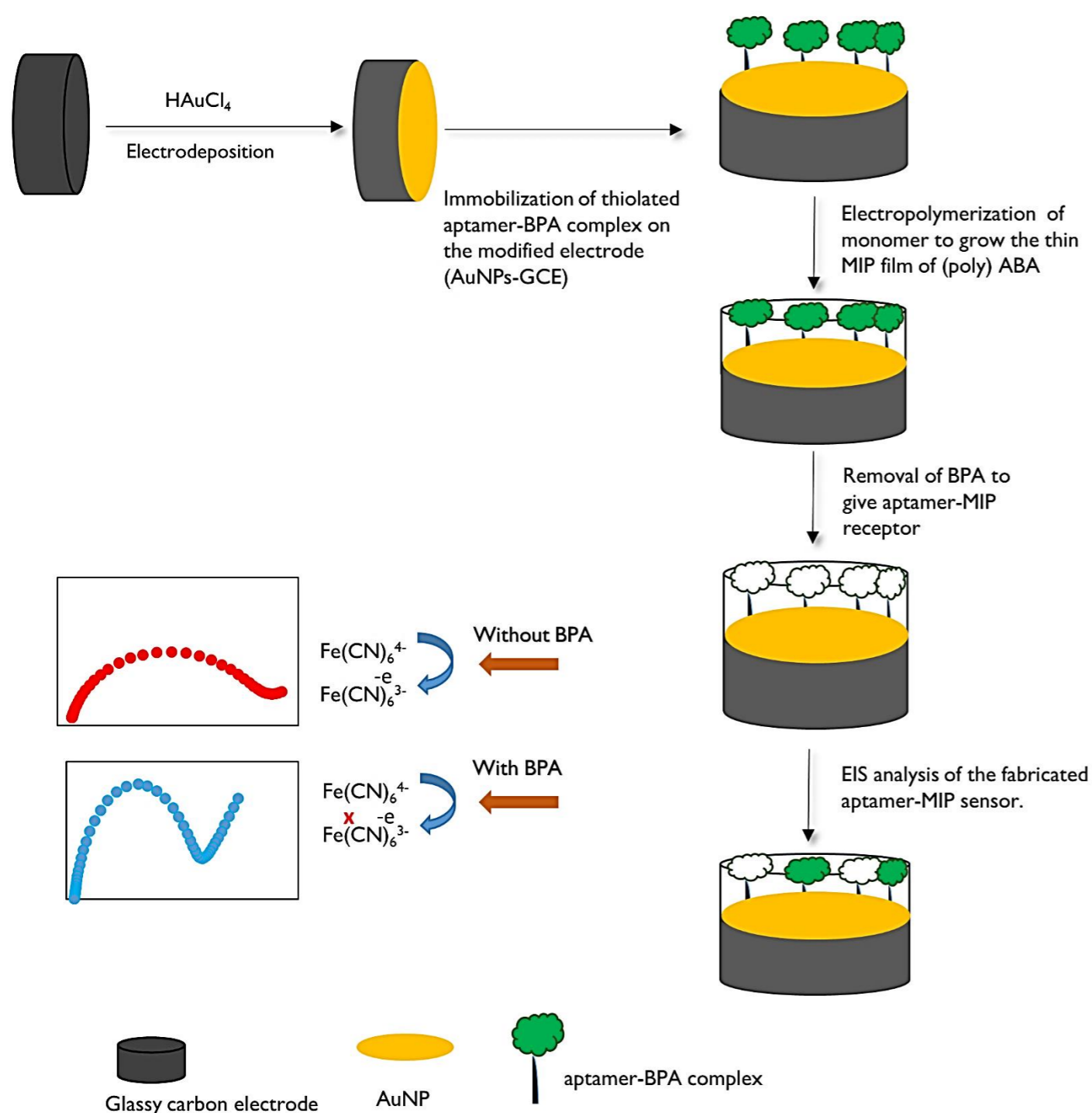
1. Introduction

Bioinspired materials have emerged as alternatives to antibodies and enzymes in biosensor for environmental monitoring. These are tailored made in order to mimics the molecular function of a natural receptors in biosensor. Aptamers and Molecularly imprinted polymers (MIPs) are promising options in synthetic receptor research as these materials overcome the limitations in robustness, cost and stability of biological receptors.

2. Experiment

2.1 Fabrication of the hybrid Sensor

Fig 1. depicts the schematic representation of the different steps of the Aptamer-MIP sensor design integrating the two technologies.



3. Results

Fig 2. Characterization of (a) CV, and (b) EIS of a) GCE, b) AuNP/GCE, c) aptamer/AuNP/GCE, d) BPA@aptamer/AuNP/GCE and e) poly-ABA /BPA@aptamer/AuNP/GCE in 5.0 mmol L⁻¹ [Fe(CN)₆]^{3-/4-} as a redox probe and 0.1 mol L⁻¹ KCl.

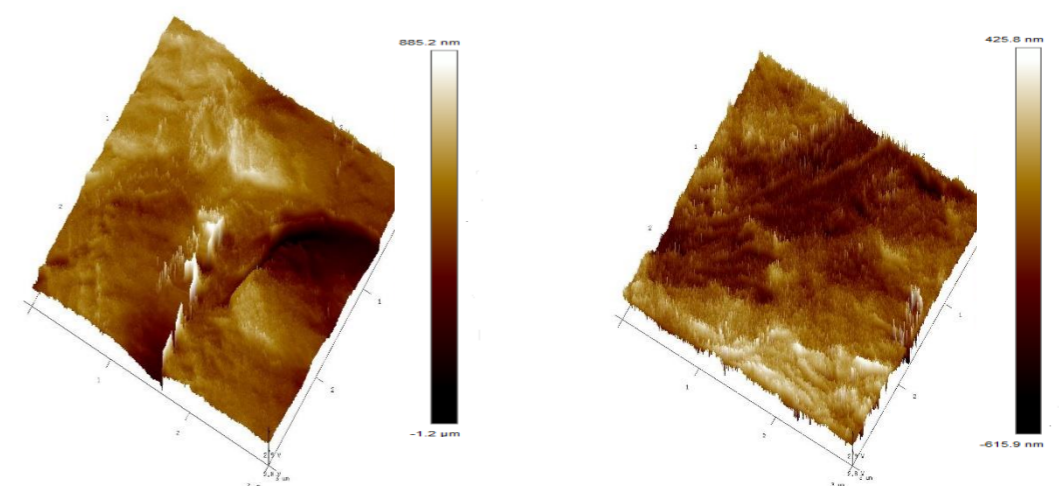
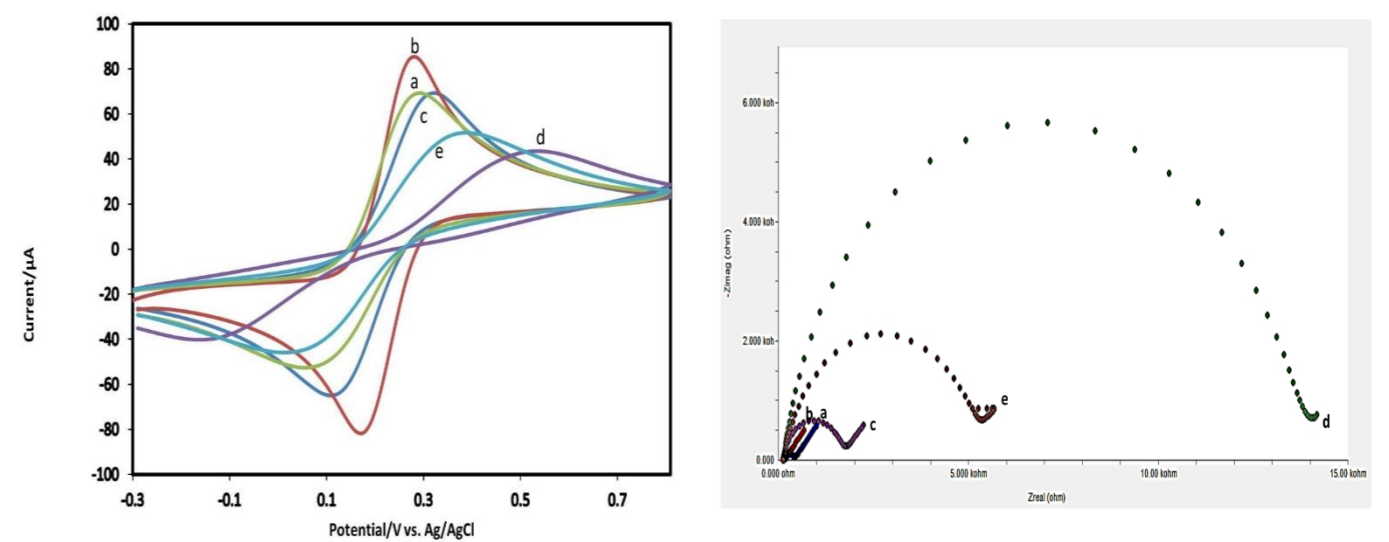


Fig 3. AFM images of the aptamer-MIP layer before (a), after (b) washing

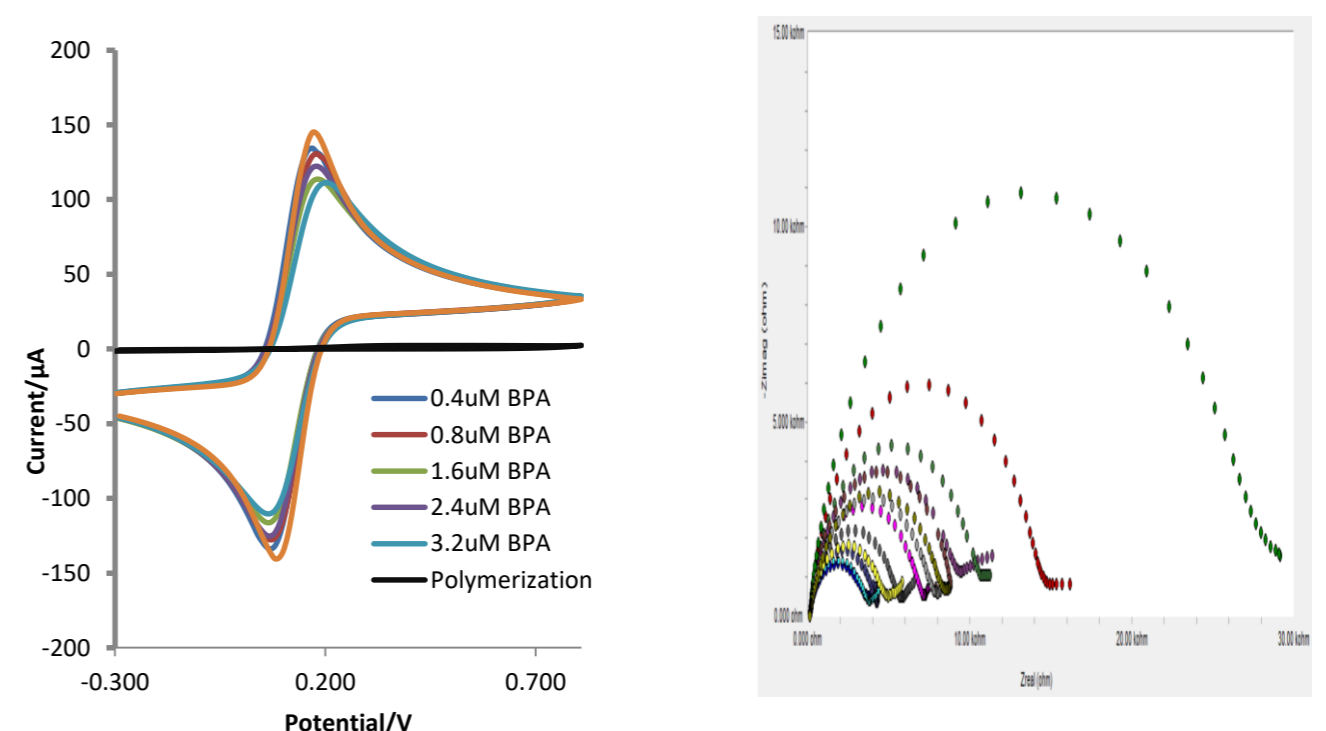


Fig 4. CV, and EIS responses of poly-ABA@aptamer/AuNP/GCE after incubated in various BPA concentrations

Challenges to be met:

- Characterization of the sensor in details using SEM, AFM
- Modification of the Aptamer sequence with polymerizable monomer

[1] Yarahmadi (2019) *Microchim Acta* 186: 71

[2] Ensafi (2018) *Microchim Acta* 185: 265

[3] Ghanbari (2018) *Sensors and Actuators B: Chemical*, 258, 1066-1071

[4] Jolly (2016) *Biosensors and Bioelectronics*, 75, 188-195

Outlook: Optimization of the different combination aptamer and monomer as well as recycling of the sensors.

Acknowledgement

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