Electrode preparation and Electrochemical Impedance Spectroscopy (EIS) Setup

Introduction

Preparation of the electrodes, applying phages and measuring the impedance over a frequency spectrum

Procedure

1. The AuNPs-modified electrodes were washed with MQ Water to remove any particles and impurities adsorbed on the electrodes surface
2. A 5µL drop of 10mM L-Cysteine solution was added on our gold nanoparticle functionalised working electrode and left overnight at 4°C
3. The electrode was then washed with PBS puffer (pH 6.8)
4. The acid group on the self-assembled monolayer of L-Cysteine was thereon activated via a 5µL drop of 30mM EDC/NHS solution in PBS
5. After 1 hour of incubation, the HB10c2 Bacteriophage was immobilized by directly dropping 5µL of 10^9 PFU/mL HB10c2 Bacteriophage solution on the amine-reactive sulfo NHS ester
6. Incubation was carried out overnight
7. The electrode was then again washed with PBS buffer to remove any adsorbed phages or proteins on the surface
8. To block nonspecific active sites on our electrode, 5µL of a 0.2% w/v solution of BSA (in PBS) was dropped on our functionalised electrode surface and incubated for 1 hour, followed by washing with PBS

9. The screen-printed electrode was then treated with 5µL of a Paenibacillus larvae solution, incubated for 1 hour and washed with PBS

- Impedance spectra were taken for the bare electrode, the electrode with L-Cysteine, after the immobilization of bacteriophages, the blocking with BSA and the immobilization of *Paenibacillus larvae*

- For each measurement, 100µL of a 5mM $[Fe(CN)_6]^{-3/-4}$ solution in 0.1M KNO_3 were used as a redox couple. A frequency range of 100 kHz to 0.1 Hz with an amplitude of 0.01 V was consistently applied for all screen printed electrodes (SPE)