Title: Fabrication of new biosensor based on gold nanoparticles and chitosan matrix for selective detection of chlorophenol and nitrophenol.

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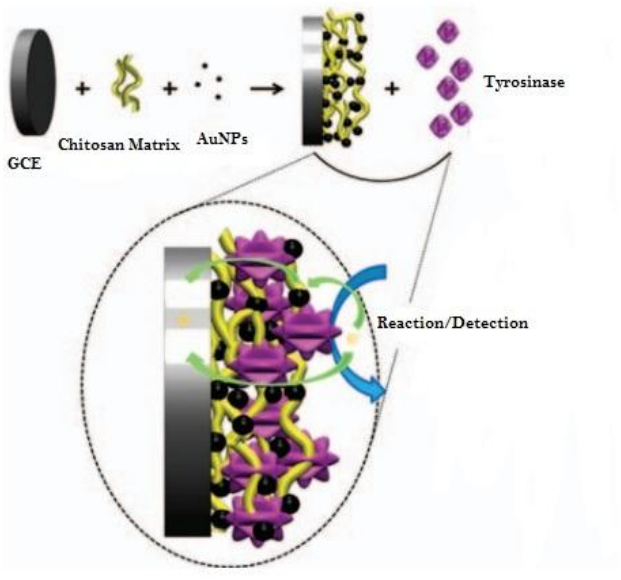
Keywords: Biosensor, gold nanoparticles, chitosan, tyrosinase, chlorophenol, nitrophenol, glassy carbon electrode (GCE).

I. Abstract

It is highly recommended to design and manufacture cost effective analytical tools to monitor harmful organic pollutants in our environment. Phenols are a class of widely used hazardous and dangerous organic compounds that have serious effects on human health and the environment. This present study reports an inexpensive and robust, sensitive and selective electrochemical biosensor for chlorophenol and nitrophenol detection, both of pollutants are electroactive compounds which may be oxidized or reduced by electrocatalysts (**Wang et all, 2018**). We propose a novel biosensor architecture based on gold nanoparticles (AuNPs) and chitosan matrix. Here, chitosan and gold nanoparticles were used as the bionanocomposite matrix to immobilize tyrosinase enzyme in the biosensor construction using glassy carbon electrode (GCE). The electron transfer rate increased by the bio-catalytic activity of gold nanoparticles (**Mohtar et al, 2018**) and possession of the porous morphology of chitosan (**Chakraborty et al, 2019**) provided excellent entrapment of the tyrosinase enzyme.

The proposed electrode (Tyr/AuNPs/Chit/GCE) is expected to achieve a significant electrochemical behavior and electroanalytical performances compared to bare electrode (sensitivity and selectivity, stability and reproducibility). In addition, the current response is proportional to the concentration of chlorophenol and nitrophenol which attributed to the reduction of o-quinone formed on the surface of the electrode. As a result, Tyr/AuNPs/Chit/GCE biosensor is ready to evaluate a real sample of water.

II. Image:



Schematic illustration of the enzymatic biosensor **Tyr/AuNPs/Chit/GCE**

III. Reference:

1. Chakraborty S, Ilagan A P D. 2019. Chitosan Curcumin Film As A Sensor For Detection of O-Nitrophenol and Fluoride Ion Using Fluoresce Quenching Technique. *Philippine Journal of Science* 149 (1): 27-33.
2. Lina Mohtar, Pedro Aranda, Germán A. Messina, Mónica A. Nazareno, Sirley V. Pereira, Julio Raba, Franco A. Bertolino , Amperometric biosensor based on laccase immobilized onto a nanostructured screen-printed electrode for determination of polyphenols in propolis. Microc (2018), doi:10.1016/j.microc.2018.08.038.
3. Wang M, Liu Y, Yang L, Tian K, He L, Zhang Z, Jia Q, Song Y, Fang S, Bimetallic metal–organic framework derived FeO*x*/TiO2 embedded in mesoporous carbon nanocomposite for the sensitive electrochemical detection of 4-nitrophenol, *Sensors and amp; Actuators: B. Chemical* (2018). doi.org/10.1016/j.snb.2018.11.083

IV. Biography:

Mr. Hicham MESKHER has completed his environmental engineering studies at the age of 24 years from Algiers National Polytechnic School (ENP Alger), Algeria. He is a PhD student at Kasdi Merbah University in Ouargla, Algeria. He has published one paper about water scarcity in the Moroccan Atlas Mountains and has participated in several related conferences and summits in MENA region and Turkey.

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