

# Development of GCE modified with graphene derivatives for detection of paraquat

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## Abstract

Paraquat (PQ) is a well-known herbicide that is widely used in agriculture but it is highly toxic, negatively influencing the respiratory system, damaging livers, heart, kidneys and resulted in death [1]. Therefore, the main goal of this study is to develop sensitive and selective electrochemical sensing platform suitable for the monitoring of the concentration of this herbicide in the environment. Here, we present novel electrochemical sensor based on state-of-the-art graphene derivatives<sup>[3][4]</sup> which can be equipped with different functional groups that results in enhanced conductivity as well as selectivity. To prove that, two graphene derivatives (nitrogen doped graphene labelled as GN3 and "graphene acid" modified with iron nanoparticles) [2] were selected and tested as potential candidates suitable for PQ determination. The sensor characterization was accomplished via electrochemical impedance spectroscopy (EIS), cyclic voltammetry (CV) and square wave voltammetry (SWV). Obtained results indicate that such derivatives possess sufficient electrochemical response against PQ giving the sensitivity 0.0702 ( $\mu\text{A}/\text{mM}$ ), correlation 0.984 and linear range 0.05 - 1.25 mM, respectively. Moreover, there is well-visible shift of the potential during the sensing of PQ for both derivatives, which was obtained at -0.65V. Such findings imply, that would be possible to build multiplex sensing platform suitable not only for the determination of PQ but also for the determination of herbicides with the similar structure (imidacloprid and thiamethoxan).

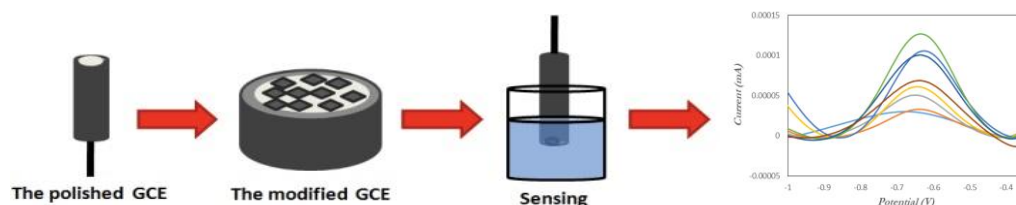
## References

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**Figure 1:** Typical SWVs of paraquat obtained using GCE modified with GAFe in BRB pH 7.04