Electro-Sensing of Herbicides Enhanced by Nanomaterials in Environmental Samples

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Abstract

Linuron (LIN) is a widely used phenyl urea herbicide known for its persistence in soil and water, posing significant risks to ecosystems and human health. While conventional detection methods such as chromatography are accurate, they are often time-consuming and costly. In contrast, electrochemical sensing—particularly when enhanced with nanomaterials—offers a promising alternative for rapid, sensitive, and cost-effective detection in complex environmental matrices.
This study aimed to develop an electrochemical method for the detection of Linuron, a pesticide with documented adverse effects on human reproductive health [1]. For this purpose, printed carbon electrodes fabricated in our laboratory [2] were used and further modified with graphene oxide synthesized in-house using two different methods. The synthesized carbon nanomaterials such as reduced Graphene Oxide (rGOx) were characterized using Scanning Electron Microscopy (SEM) and Dynamic Light Scattering (DLS), confirming successful synthesis (Fig 1 B).
Additionally, cyclic voltammetry results demonstrated that the use of reduced graphene oxide significantly improved the sensitivity of the developed detection method (Fig 1 A).

References

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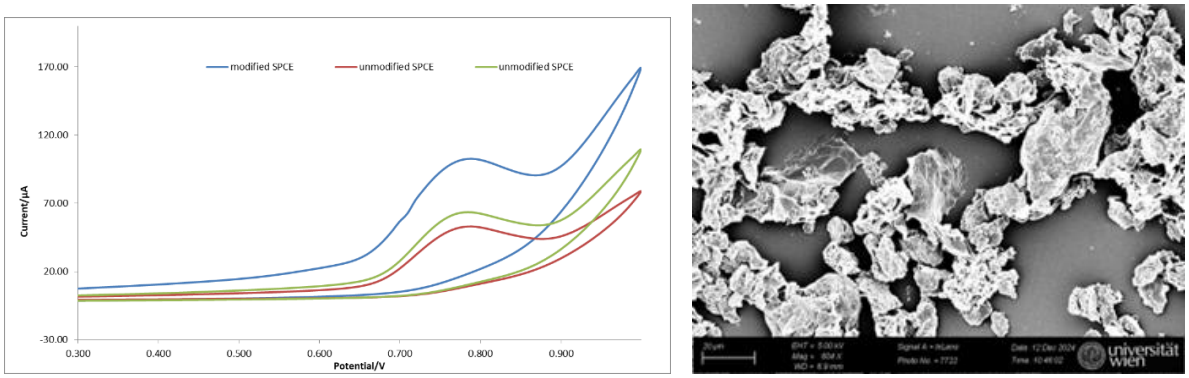

A B

Figure 1:(A) Cyclic voltammogram of LIN (B) SEM image of rGOx