Laser-scribed rGO-based sensors for HM detection

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Abstract

Over the past decade, surface water sources have been increasingly polluted by harmful chemical substances, biological waste, and toxic contaminants, largely due to rapid industrialization and human activities.[1] Among these, heavy metal ions (HMIs) pose a significant threat due to their high toxicity, environmental persistence, and bioaccumulative nature.[2] In this study, we present graphene-based sensors designed for detecting heavy metal ions in aqueous environments. These sensors are fabricated using reduced graphene oxide (rGO) films decorated with various nanostructured materials, synthesized via a one-step CO_2 laser-assisted co-reduction process. This technique enables the simultaneous reduction of graphene oxide and metal precursors, resulting in rGO-nanostructure composites with enhanced conductivity and electrochemical reactivity.[3] Electrochemical characterization, performed through Cyclic Voltammetry (CV) and Square Wave Anodic Stripping Voltammetry (SWASV), demonstrated the sensors' high sensitivity, linearity, and reproducibility. The developed rGO-based sensors show strong potential as efficient and scalable platforms for the electrochemical monitoring of heavy metals in environmental samples.

References

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