Reduced Graphene Oxide/MOF-based Electrochemical Biosensor for Environmental and Diagnostic applications

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Abstract
This study presents the development of novel electrochemical biosensor platforms based on reduced graphene oxide (rGO) and metal-organic frameworks (MOFs) composites for the detection of water-borne pathogens and cancer-related biomarkers. By integrating GO with copper-based and chromium-based MOFs, enhanced electrocatalytic performance was observer for the composites. The combination of GO and MOFs was validated using characterization methods such as FT-IR, XRD, SEM, and XPS, confirming the successful formation of the composite. The large surface area and functional versatility of both materials enabled the covalent attachment of antibodies to develop the biosensor. These platforms offer rapid, sensitive, cost-effective, and portable detection, driven by the synergistic effects between rGO and MOFs. The resulting immunosensors exhibited high specificity and practical potential, making them promising for detecting other water-borne pathogens and cancer-related biomarkers. The combination of rGO with MOF composites offers a flexible approach to biosensing, underscoring their potential in diagnostics, environmental monitoring.

References

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Figures

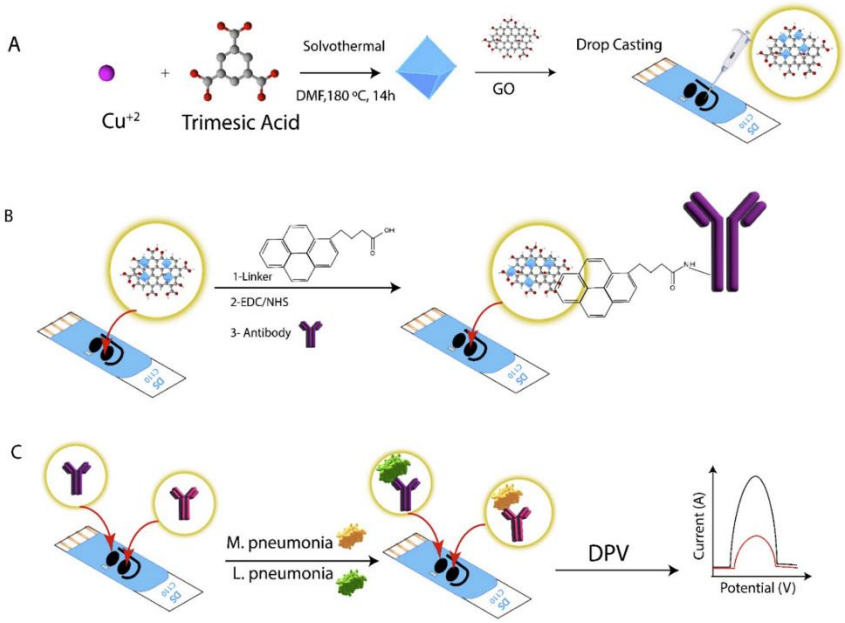

Figure 1: Illustration of (**A**) the synthesis method used for the preparation of the GO/Cu–MOF composite. (**B**) The steps for the fabrication of the immunosensor and (**C**) the dual detection of *M. pneumoniae* and *L. pneumophila* antigens using differential pulse voltammetry.