Laser Nanostructured Reduced Graphene Oxide Films: A Cost-Effective and Scalable Approach for Biosensing Applications

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In this presentation, we introduce a laser nanostructuration technique for the fabrication of reduced graphene oxide (rGO) films embedded with metal nanoparticles (MNPs), offering a cost-effective, scalable, and versatile approach to biosensor development. This single-step process combines the simultaneous reduction of graphene oxide and deposition of metal nanoparticles (such as gold, silver, and platinum) to create conductive, nanostructured surfaces with enhanced electrochemical properties. The method is notable for its simplicity and affordability, requiring minimal equipment and facilitating high-throughput production, making it suitable for point-of-care (PoC) diagnostics.
We will highlight the application of this technology in various biosensor formats, including capacitive immunosensing for the detection of clinical biomarkers like CA-19-9 glycoprotein, as well as in enzyme-free real-time monitoring of hydrogen peroxide released from live cancer cells. Additionally, we will explore the integration of rGO electrodes into lateral flow assays, improving their sensitivity and providing a promising platform for advanced PoC diagnostic tools. These examples illustrate the potential of laser nanostructured rGO films to address the need for affordable, reliable, and scalable biosensors for diverse diagnostic and monitoring applications.

References

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