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Development of Nanomaterial-Based Devices for Point-of-Care Applications in Global Health

Abstract:

In our increasingly interconnected world, the demand for rapid, accessible, and cost-effective diagnostic tools is paramount. Nanobiosensors—devices that integrate nanomaterials such as quantum dots, metallic nanoparticles, and two-dimensional (2D) materials with biological recognition elements like DNA, antibodies, and aptamers—offer promising solutions. These sensors, as stand alone or wearables, can be fabricated using sustainable substrates like nitrocellulose and advanced printing techniques, including inkjet printing and stamping, enabling mass production and scalability.

By leveraging the unique properties of nanomaterials, these devices achieve high sensitivity and specificity, facilitating the detection of various biomarkers associated with diseases such as cancer, COVID-19, and other pathogens, as well as chemical pollutants. Their compatibility with portable readout systems, including smartphones, positions them as ideal candidates for point-of-care diagnostics, particularly in resource-limited settings.

This talk will delve into the design and development of such nanobiosensors, highlighting their operational principles, fabrication methods, and real-world applications. Attendees will gain insights into how these innovative devices are poised to revolutionize diagnostics, making healthcare more accessible and equitable globally.