

Functionalization of Nanomaterials for Bio-Sensing Applications: Current Progress and Future Prospective

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Abstract : Nanomaterials, due to their unique properties, have revolutionized the field of biosensing. Their functionalization, or modification with specific molecules, is crucial for enhancing their biocompatibility, selectivity, and sensitivity. This review explores recent advancements in nanomaterial functionalization for biosensing applications. We discuss various strategies, including covalent and non-covalent modifications, and their impact on biosensor performance. The use of biomolecules like antibodies, enzymes, and nucleic acids for targeted detection is highlighted. Furthermore, the integration of nanomaterials with different sensing modalities, such as electrochemical, optical, and mechanical, is examined. The future outlook for nanomaterial-based biosensing is promising, with potential applications in healthcare, environmental monitoring, and food safety. However, challenges related to biocompatibility, scalability, and cost-effectiveness need to be addressed. Continued research and development in this area will likely lead to even more sophisticated and versatile biosensing technologies.

Keywords : biosensing, nanomaterials, biotechnology, nanotechnology

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