

# Recent Advances in Potential Nanoparticles and Nanotechnology for Sensing Food-Borne Pathogens and Their Toxins in Foods and Crops: Current Technologies and Limitations

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Food-borne pathogens cause infectious diseases in people worldwide. Hence, the development of rapid detection methods for food-borne pathogens is necessary. The application of potentially useful nanoparticles (NPs) results in enhanced sensitivity, improved response time, and increased portability owing to their distinct chemical and optical features. The widely used NPs include quantum dot (QD) NPs, metal NPs, silica NPs, and magnetic NPs as well as potent intrinsic antimicrobial NPs. The NPs can also act as multivalent scaffolds for supramolecular assemblies since their high surface-to-volume ratio enables the functionalization of unique spatial domains, allowing their versatile implementation in various sensing schemes. In this review, we focus on the developments and analytical applications of NPs in chemical and biological sensing within foods and crop matrices. We also discuss advanced tools of NP-based sensitive assays, key requirements, and shortcomings.

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