Università degli Studi di Napoli Federico II

PhD in Biotechnology - 40th cycle

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Nanotechnology-driven Biosensor for Food Allergen Monitoring in the Food Chain

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Food allergies pose a significant public health concern, with allergic reactions ranging from mild symptoms to life-threatening conditions. Given the lack of a clinical solution, strict dietary management is essential, making the accuracy and reliability of allergen-related information critical for sensitized individuals [1]. Ensuring that a food product is completely allergen-free can be challenging for food manufacturers and restaurant chains, which must address the risk of unintentional cross-contaminations. Current detection methods, including immunological assays (e.g., ELISA) and DNA-based techniques (e.g., PCR), provide reliable identification but often involve complex procedures, high costs, and the need for highly skilled personnel [2]. As a result, biosensors have emerged as promising alternatives due to their high sensitivity, rapid response times, cost-effectiveness, and potential for real-time monitoring. These devices integrate biorecognition elements with transducers to generate measurable signals in response to analyte recognition. The combination of biosensors with nanotechnologies significantly enhances their performances by taking advantage of the unique optical, electronic, and magnetic properties offered by nanomaterials [3]. This project aims to advance food safety monitoring through the development of a cost-effective and user-friendly biosensor based on metal nanoparticles for detecting relevant food allergens, with the goal of providing a reliable detection tool suitable for use by non-specialized personnel.

References

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