Nanobiosensing Devices and Types of Electromagnetic Nanoparticles in Nanobiosensor Applications

Dr.Afshin Rashid , Assistant Professor

Faculty member Islamic Azad University of Science and Research Branch, Tehran

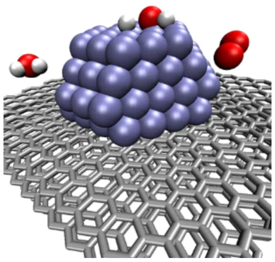
- **Abstract:**

- Various types of electromagnetic nanoparticles can be used in biosensors. And in order for magnetic nanoparticles to have biological applications, they must be biocompatible and biodegradable.

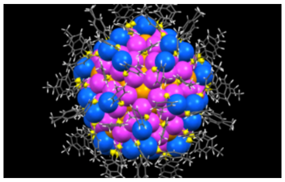
- **Keywords:** Nano structure , Nanoelectronic , Biosensors, Nanoparticles

Introduction •

In fact, biosensors are analytical tools that can use the intelligence of biological materials to identify and react with a compound or compounds. The product of this reaction can be a chemical, optical or electrical message. Many biosensors used for biological applications are capable of detecting Ca, etc. and parameters such as temperature, pressure, pH . In addition, they can be used as a biological diagnostic system for substances such as enzymes, antibodies, antigens and microorganisms. In general, biosensors consist of three basic parts: The sensor element that responds to a biological material is biological in nature. This element must be connected to a transducer. The transducers (nanobiosensors) themselves are divided into several categories, which are divided based on the signals received: electrochemical, optical, thermal, piezoelectric, etc. The third part is the processor, which is responsible for displaying the signals converted by the transducer . In addition, the attractive properties of nanomaterials pave the way for the construction of a wide range of electrochemical sensors that improve analytical power .



Nanotechnology has had a significant impact on nanobiosensors, so that it is now possible to prepare a variety of nanomaterials with controllable size, shape, surface charge and desirable physical properties . The potential for use as a non-invasive diagnostic tool and the combination of multiple methods in a single probe are two major advantages of nanomaterials that can be mentioned. All these factors lead to high sensitivity in them and a deeper understanding of environmental processes. The ability of nanobiosensors to detect nano- and bio-biomolecules and the characteristics such as sensitivity, flexibility and scalability of this sensor can be used as a new paradigm in analytical and clinical tools. Nanomaterials usually increase the sensitivity of sensors in nano-electrochemical or nano-biological methods. Among the developed nanomaterials, structures such as carbon nanotubes (CNTs), silicon nanowires (SiNWs) and conductive polymer nanotubes (CPNTs) are significantly used in the manufacture of sensitive sensors.



In the case of nanobiosensors, critical dimensions are directly related to the sensing performance of the nanobiosensor, such as the dimension that controls the amount of surface area available for mapping the detection elements , the dimension that measures the strength of a signal in electrochemical nanobiosensors , or the accessible surface area that detects the formation of complexes between the detection elements and the target analytes in mechanical transducer nanobiosensors . Structures such as nanowires, metal nanoparticles, magnetic nanoparticles, single-walled plates, and carbon nanotubes can be used for nanochemical sensing due to their unique nanoelectrical, optical, and magnetic properties .

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