Functional Nanostructured Materials for Biomedical Applications

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Nanomaterials have an increased versatility and multifunctionality and they can fulfil several roles, such as catalysts, amplifiers of electrical conduction or molecular recognition component, but also as nano-carriers for molecules. Thus, functional nanostructured materials can be obtained and used in the development of molecular detection and delivery platforms, playing a crucial role, topics that will be presented in this work.

The use of biomolecules, like enzymes, in biosensors as analytical tools, offer big advantages for real-time detection due to their high specificity, selectivity, and quick response. They must be immobilized on different surfaces through processes that reduce the enzymatic activity. Nanozymes are nanomaterials with enzyme-like characteristics, and they can address the limitations of natural enzymes. In this talk, biomolecular analysis using natural enzyme-based biosensors versus nanozyme-modified sensors are evaluated and discussed. Carbon and metallic nanoparticles were employed as functional nanomaterials and evaluated for analytical detection of drugs and antioxidant capacity of real samples [1,2].

For drug delivery systems, an efficient approach for functional nanostructured materials was ascertained in different configurations [3,4]. Albumin proteins and liposomes were used as nanoparticles (NPs). The binding mechanism and affinity of the interaction between NPs with drug, and the effects of other biomolecules on the NPs-drug complex are evaluated and discussed for future development of efficient drug delivery systems.

References:

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