Nanobioprobes and nanobioconjugates for diagnosis and treatment of diseases

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Abstract

Nanobioengineering utilizes many alternatives to assemble materials at a nanometer-scale size in the frontier of different areas, with new unique properties regarding their bulk material counterparts. It also searches for new or existing (bio)materials, understanding their interactions and providing new functionalities for new products and unexpected applications. In health care, nanobioengineering offers outstanding opportunities to design diagnostic and therapeutic tools. For example, nanobioprobes and nanobioconjugates may provide a convenient real-time diagnosis of diseases closer to the patient and opportunities for more efficient drug delivery and targeted therapeutics concerning conventional technologies.

This talk will discuss nano-bioengineered material-based functional platforms developed in our group to diagnose and treat diseases. The first part will highlight new approaches regarding nanobiosensors to detect viral infections and their discrimination among related viruses [1,2,3], including nanobiosensors for SARS-CoV-2 detection [4, 5, 6]. The second part will cover strategies for encapsulating therapeutic agents into functionalized nanoparticles -photosensitive [7] or not [8]- for site-directed specific intracellular cargo delivery; and photosensitive micromotors for enzyme protection and dynamic substrate degradation [9]. Overall, the talk will demonstrate nanobioengineering's enormous potential for tackling real-life problems in today's world and highlight their opportunities for multiple clinical diagnostic and therapeutic applications.

References

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