

Plasmonic nanoparticles and multifunctional nanocomposites for analytical and theranostic applications

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Recent advances in fabrication and biomolecular functionalization of plasmonic gold and composite nanoparticles have led to dramatic expansion of their potential biomedical applications [1] (simultaneously with growing biosafety concerns [2]), including biosensorics, bioimaging, photothermal therapy, and delivery of target molecules through cellular nanoparticle uptake [3]. Multifunctional nanocomposites that combine therapeutic, diagnostic, and sensing modalities in a single nanostructure are widely used in a new field of nanobiotechnology called theranostics. Although the term “theranostics” has been introduced quite recently, it is now rapidly growing and promising field at the crossroads of plasmonics and nanomedicine. In this talk we summarize our recent efforts in analytical and theranostic applications of engineered gold nanoparticles (GNPs) and nanocomposites by using their plasmonic properties and various optical techniques [4]. Specifically, we provide examples of SERS platforms for analytical biosensing [5]; GNP-enhanced PCR diagnostics; visualization and bioimaging of cells; combined photodynamic and photothermal treatment of pathogenic bacteria [6] and xenografted tumors [7].

References:

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