Plasmonic Biosensors

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This presentation consists of two main parts: (1) the preparation, characterization and optimization of nanostructures/nanosandwiches for the basic understanding of their optical properties and the development and testing of nanosandwiches as model biosensors; (2) synthesis of gold nanorods and changing the growth process to produce nanoparticles and nanobubbles.

Noble metal nanoparticles have received a great deal of interest for their optical and plasmonic properties. These properties, which depend on size and structure, have brought a great potential in nanoelectronics and nano-biosensors.[1]

This study reveals that nanoparticles in the form of triangle nanosandwiches prepared using natural lithography [1] or in the form of nanorods/nanobubbles prepared by wet chemistry have important optical properties and that the enhanced sensitivity of their surrounding environment can be used as a new class of optical sensors using Localized Surface Plasmon Resonance (LSPR) spectroscopy (Figure 1)

The second part of the study was to develop new synthetic methods for preparation of plasmonically active nanoparticles (NPs) such as nanorods (NRs) and nanobubbles. Different nanostructures exhibited varying optical properties owing to their shapes (Figure 2). Finally, the gold nanorods were conjugated with nanodot arrays for development of a nanoscale mechano-optical device

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References

[1] H.M. Zareie et al., ACS Nano 2, 8 (2008).

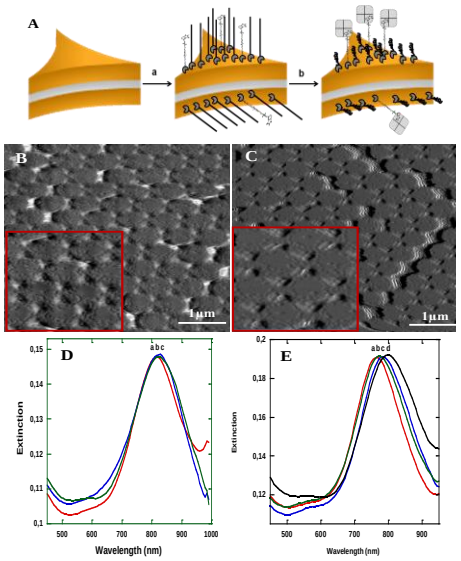

Figure 1. (A) Schematic illustration of mixed SAM functionalized nanosandwiches and streptavidin detection above the LCST. (B-C) AFM images of unfunctionalized and functionalized nanosandwiches. (D-E) LSPR measurements of unfunctionalized and functionalized nanosandwiches.

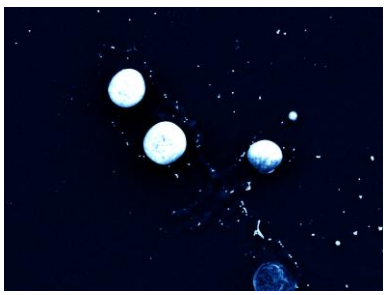

Figure 2. SEM micrographs of nanobubbles.