Nanophotonic Biosensors Based on Localized Surface Plasmon Resonance (Nano-SPR)

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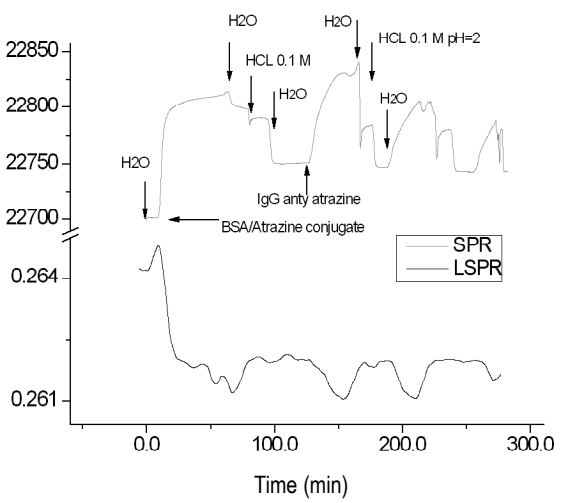
The ability of noble metal nanoparticles to transduce dielectric changes at the molecular level through their localized surface plasmon resonance (LSPR) has garnered tremendous interest over the last decade. Expansion of the methods used to fabricate metallic nanoparticles is critically important in order to commercially exploit their plasmonic response for various applications including biosensing. The localized surface plasmons resonance (LSPRs) found in noble metal constructs are the result of collective electron density oscillations resonantly driven by incident electromagnetic radiation at visible wavelengths. This resonant condition is characterized by enhanced absorption and scattering cross-sections and is strongly dependent on the dielectric medium in their local nano-environment. LSPRs exhibit a high degree of tunability based on the shape, size, composition, and interparticle couplings of the nanoparticle system. Real-time detection of biomolecular bindings has been performed by using metallic nanoparticle arrays fabricated by nanoimprint lithography and compared directly with commercial LPR system. This project is supported by CDC with a subcontract from Duke University (number 04-SC-CDC-1012), a David and Lucile Packard Foundation Graduate Fellowship, and a UNCF-Merck Science Initiative Fellowship.



Biomolecular detection using the localized surface plasmon resonance of a nanoparticle array and the surface plasmon resonance of Au thin film.