

The ultrasensitive detection of prostate cancer biomarker based on resonant Rayleigh light-scattering response of single Au nanoparticle

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A proof-of-concept study was reported on analysis of antigen-antibody recognition based on resonant Rayleigh scattering response of single Au nanoparticles in an imaging chamber. As benefited by a traditional dark-field microscope and a spectrograph, individual Au nanoparticles (30 nm) were observed with high signal to-noise ratio and they were effectively utilized to monitor changes in refractive index induced by specific binding of the adsorbates. Using PSA antigen as a model, a LSPR λ_{\max} shift of about 2.85 nm was recorded for a molecular binding corresponding to 0.1 pg/ml of the protein biomarker. This result successfully demonstrates a non-labeling detection system for proteins as well as thousands of different chemical or biological species, and it possesses a great potential as a sensitive, on-chip and multiplexing detection.