Label-free imaging to single nanoparticle by using TIR-based Interface Scattering

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Abstract

Total Internal Reflection (TIR) microscopy combining fluorescent probe has been widely used in the bio-imaging. As the bleaching and quenching introduced by the fluorescent probe, people kept on looking for the label-free microscopic method. Studies on label-free imaging has been implemented by collecting the space scattering of evanescent wave excited by total internal reflection, and imaging to ~40 nm single gold nanoparticle and ~ 100 nm single virus has been achieved [1-2]. Here, we introduced a novel label-free TIR-based Interface Scattering approach, which images the single nanoparticle by using the interface scattering of evanescent wave. The evanescent wave excited by TIR-based illumination, then the nanoparticle polarizes and emits the scattering which includes both space and interface scattering (shown in Figure 1). The interface scattering interferes with the incident evanescent wave is collected for imaging. We presented the imaging of single 200nm and 100nm polystyrene nanoparticle (shown in Figure 2). This approach is potential for application in fast, in-situ, label-free nanoscale imaging.

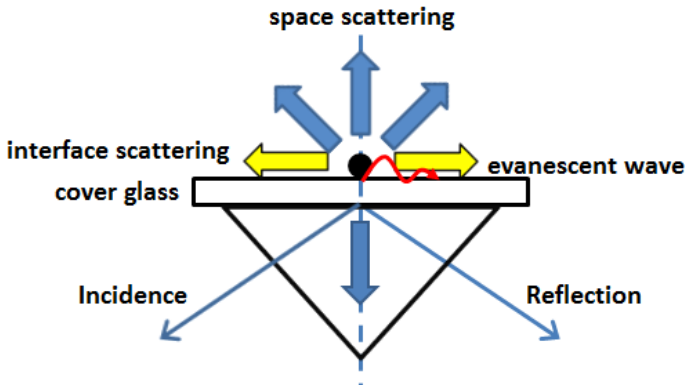

Figure 1 The schematic of TIR-based interface scattering of single nanoparticle

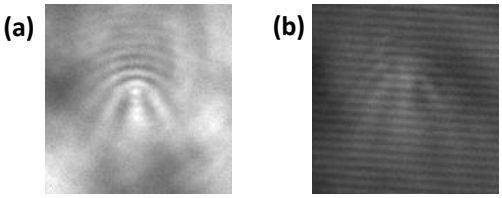

Figure 2 The experimental imaging to single (a) 200 nm and (1) polystyrene nanoparticle

References

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[2] Enoki, S.; Iino, R.; Morone, N.; Kaihatsu, K.; Sakakihara, S.;Kato, N.; Noji, H. Label-Free Single-Particle Imaging of the Influenza Virus by Objective-Type Total Internal Reflection Dark-Field Microscopy. PLoS One 2012, 7, e49208.