Direct Near-field Observation of Orientation Dependent Optical Response of Gold Nanorods

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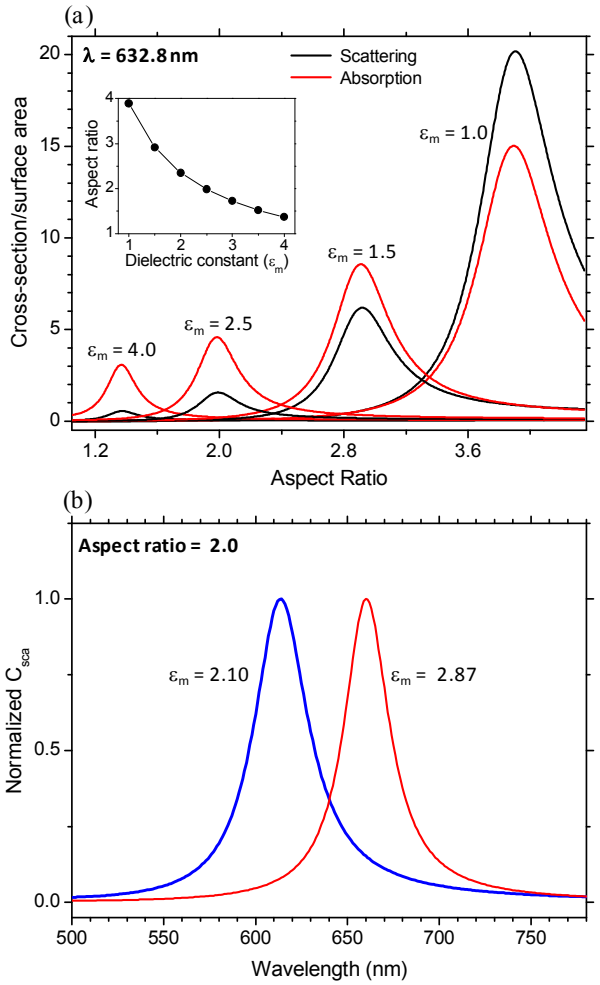

Figure S1. (a) Scattering and absorption cross-sections calculated using equations (3) and (4) at different dielectric constant of the medium (ε_m) as labeled (the calculated cross-sections are divided by the surface area of the prolate spheroid). In the inset, the aspect ratio that gives maximum cross-section at λ = 632.8 nm for a given ε_m is plotted as a function of ε_m. (b) Normalized scattering cross sections of a prolate spheroid with aspect ratio 2.0 at the indicated medium dielectric constants.

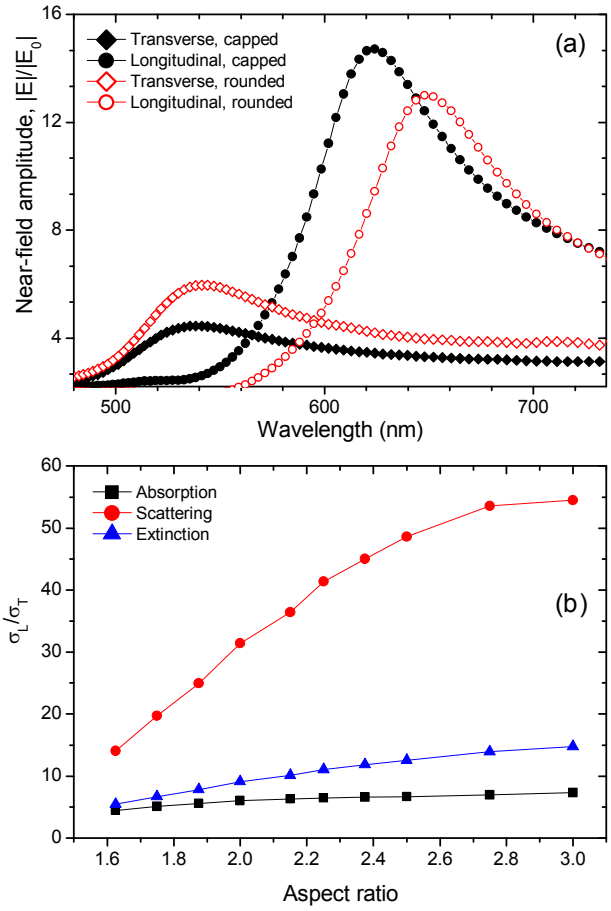

Figure S2. (a) Comparison of the near-field amplitude when the electric field is oriented parallel (circles) and perpendicular (diamonds) to the long axis of 43 nm × 86 nm gold nanorod based on the configuration shown in Figs. 4a and 4b. The plots are obtained by using the maximum values on a plane 1 nm away from the end (for the longitudinal mode) and away from the side (for the transverse mode) of the nanorod. The black and red curves are obtained modeling the nanorod as a cylinder capped with hemispheres at the two ends and a cylinder with rounded ends, respectively. (b) Ratio of longitudinal (σ_L) to transverse (σ_T) mode cross-sections.

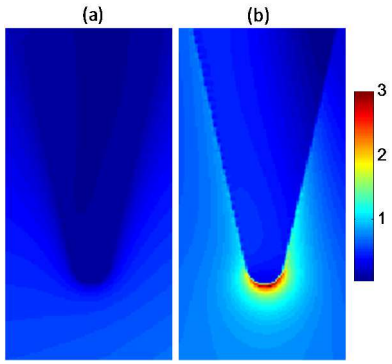

Figure S3. Field enhancement at the tip of a conical silicon probe at 60^{o} incident angle with (a) S-polarized light (electric field perpendicular to the tip axis) and (b) P-polarized light (electric field has projection along the tip axis, $E_z = 0.866E$). In the FDTD simulation, a Gaussian source is used and grid size of 1 nm in all x, y and z-directions is used. The probe is modeled as 1 μm length with radius of curvature of 10 nm, and the area of the displayed image is 90 nm × 180 nm.