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Supporting Information

Strong Plasmon Coupling in Self-assembled Superparamagnetic Nanoshell Chains

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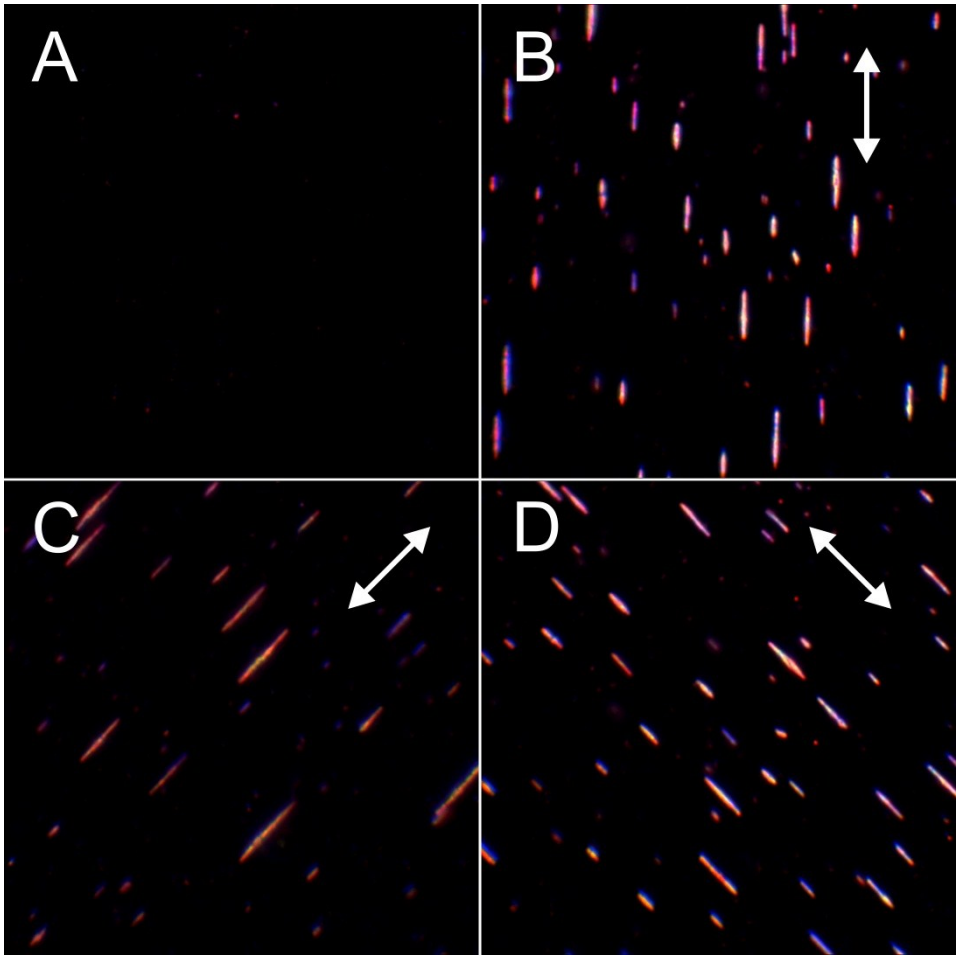

Figure S1. Dark-field images of SN aqueous solution applied without (A) and with (B-D) an external magnetic field along different directions. White arrows indicate the direction of magnetic field.

Dark-field scattering images were obtained via our home-built dark-field system (Leica DM2700 microscope, SunTime 130E CMOS digital camera, Leica 50×/0.55NA reflected light dark-field objective). For monodispersed SN aqueous solution, the scattering signal of single SN is relatively too weak to be observed in dark field images. When an external magnetic field was applied, a great number of parallel SN chains with different lengths can be formed spontaneously along the orientation of magnetic field. While for SN chains the scattering signals become much stronger than the single SN so that they can be clearly detected in the dark-field image.

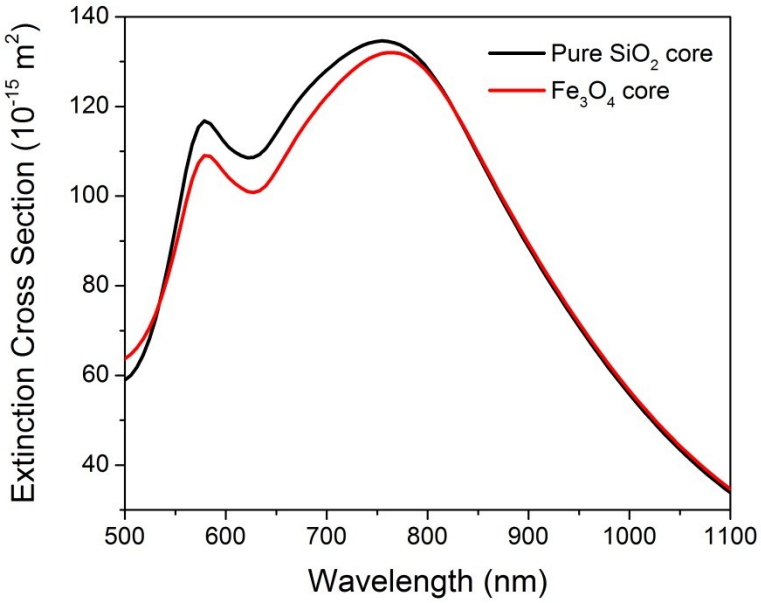

Figure S2. FDTD simulated optical extinction cross-section results of a SN with (red) and without the Fe_3O_4 core (black) in aqueous solution.

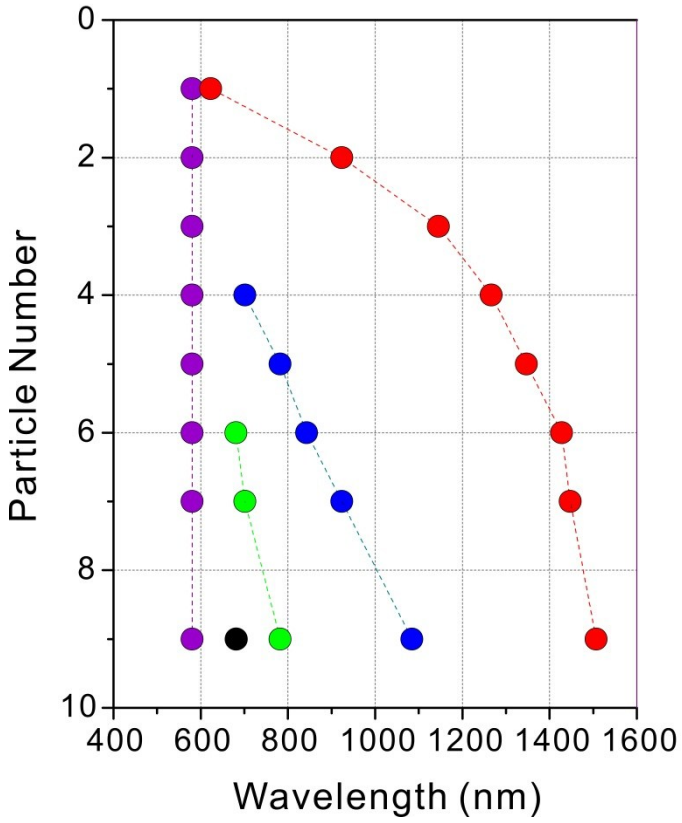

Figure S3. The wavelength positions of different plasmon modes indicated by colorful circles corresponding to Figure 3C for SN chains with different particle numbers (N).

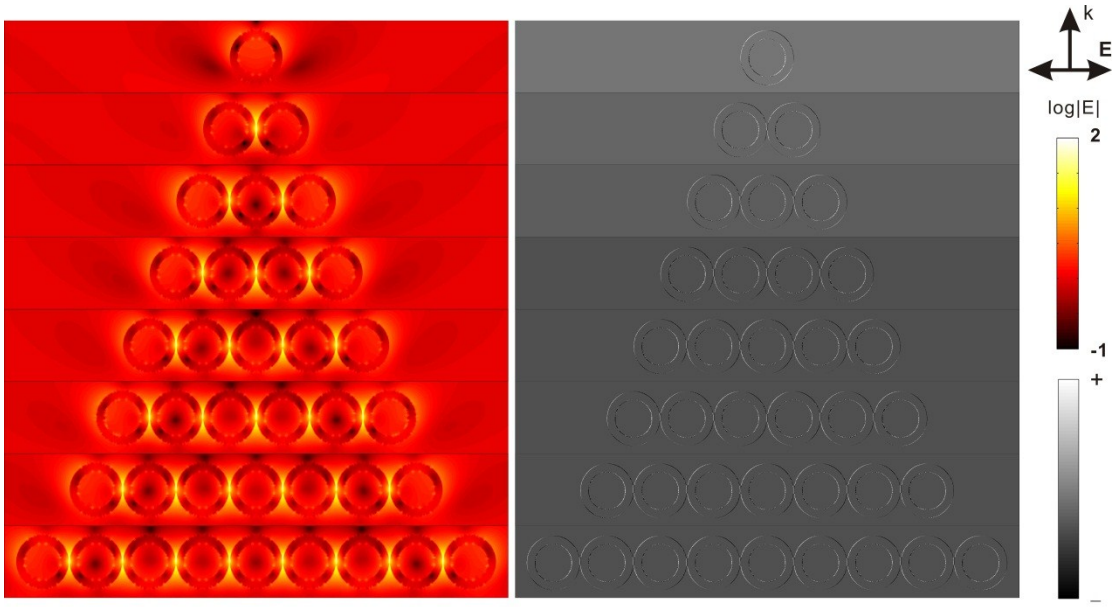

Figure S4. The electric field and surface charge distribution of modes at 580 nm for each nanoshell chain. The incident wave vector, k, and polarization direction show in the top right corner.

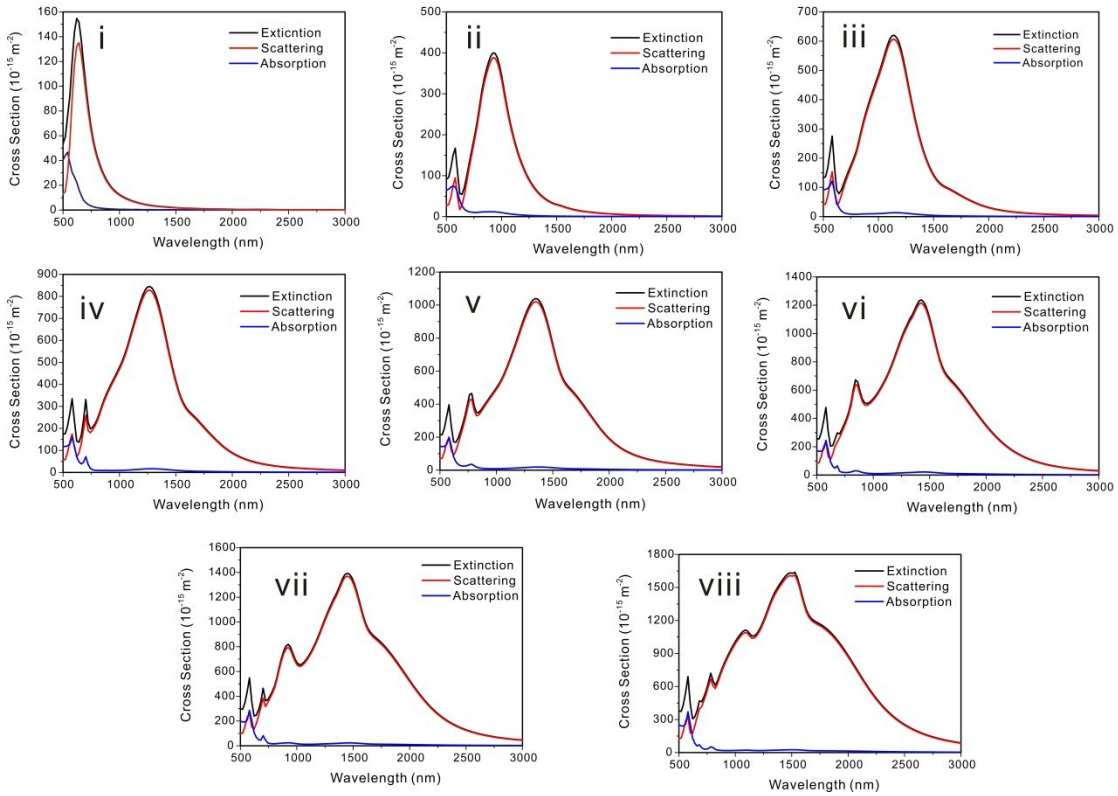

Figure S5. Calculated optical extinction (black), scattering (red), and absorption (blue) spectra of SN chains composed of different particle numbers (i to viii when N = 1 to 9).

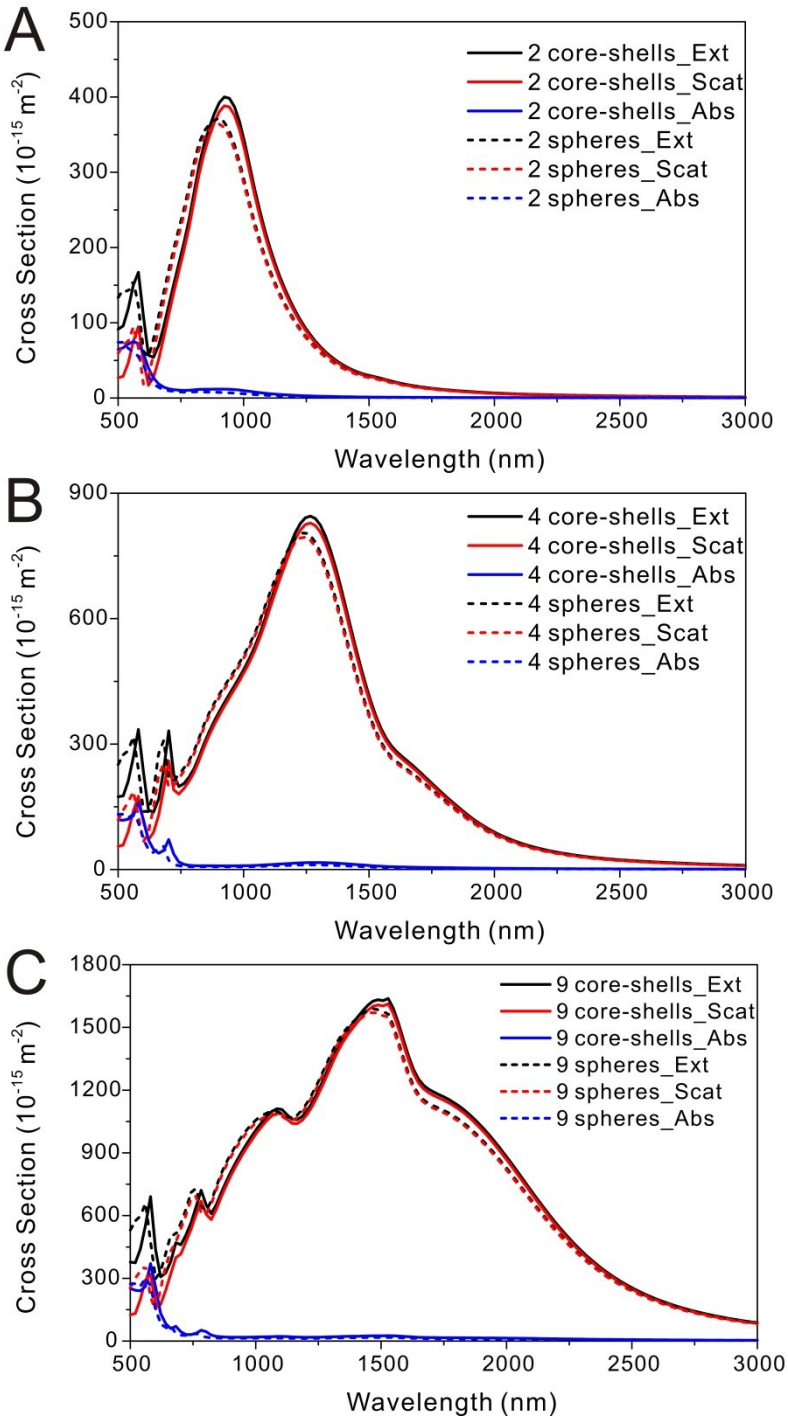

Figure S6. Compare of the same size nanoshell and gold sphere chain-like structure. From the extinction, scattering, and absorption spectra, there is only a slight shift of resonance peak.

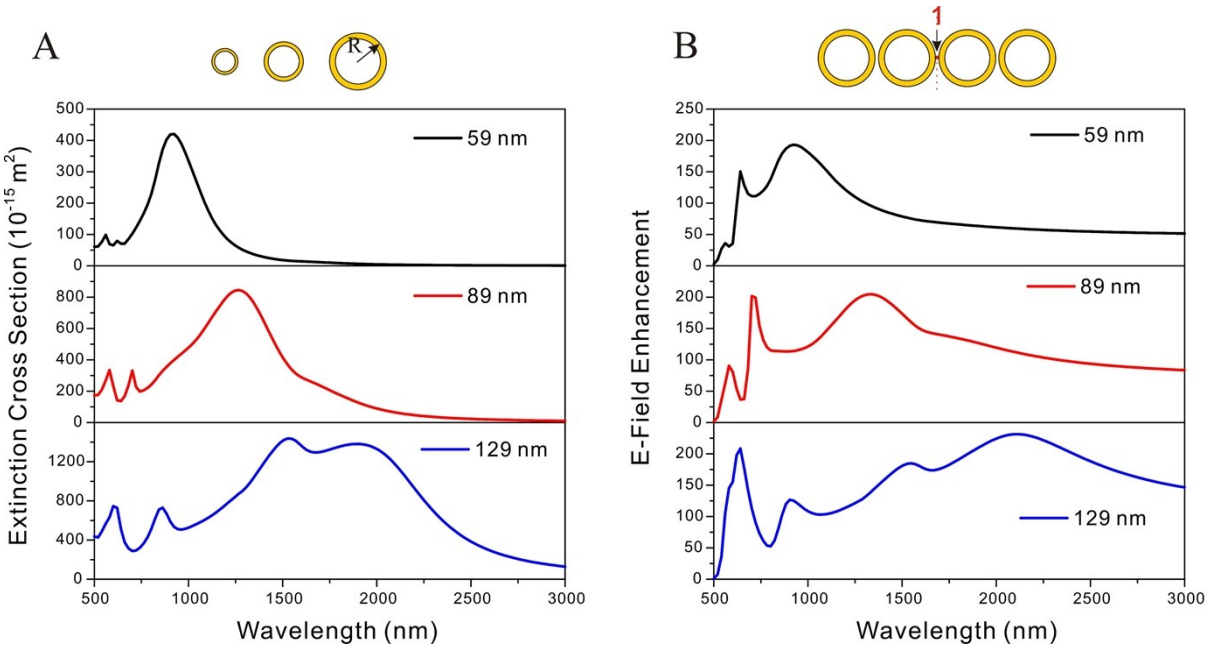

Figure S7. (A) Extinction spectra of four-SN chains composed of SNs with different outer radius and (B) corresponding electric field enhancement at midpoint of gaps.

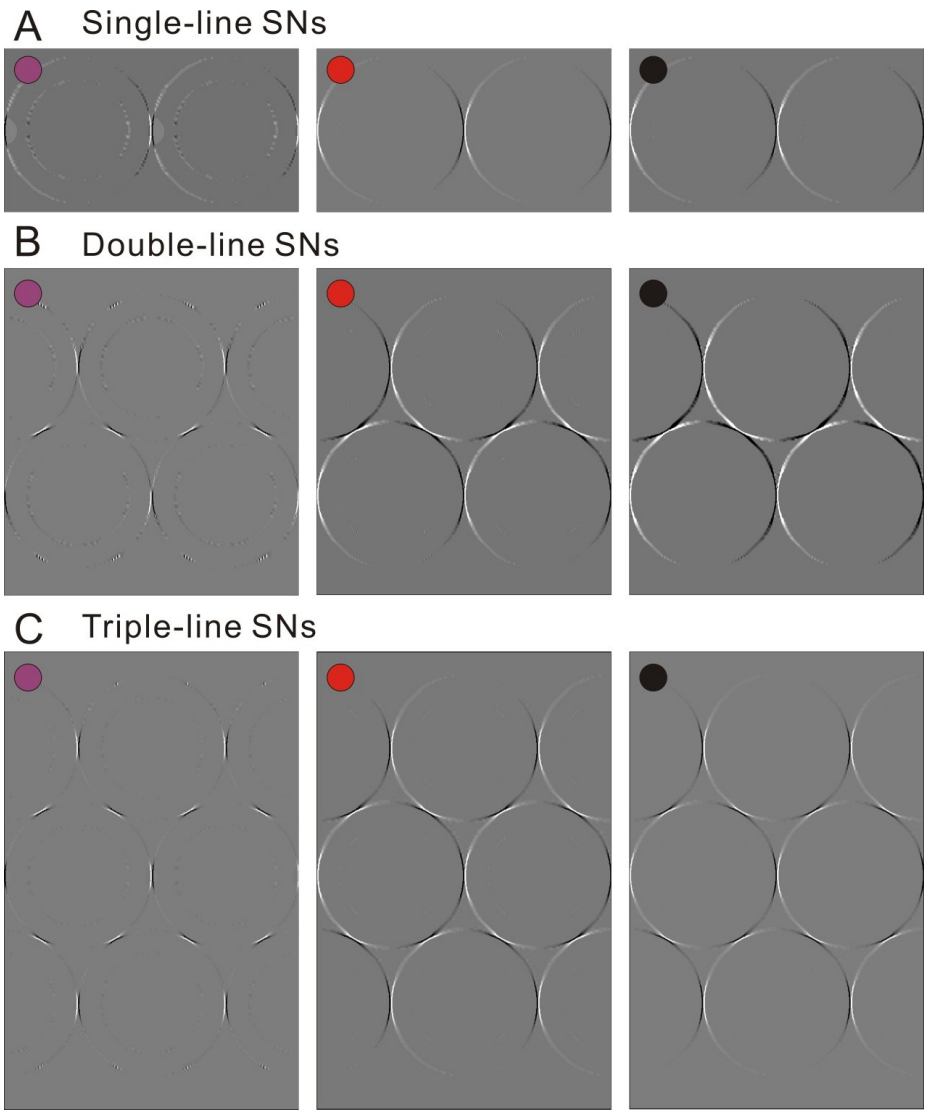

Figure S8. Surface charge distribution of SN chains composed of (A) one, (B) two, and (C) three SNs in width at purple, red, and black circle position corresponding to Figure 5A.