Supplementary information for

# Long-range Plasmon-Assisted Chiral Interactions in Nanocrystal Assemblies

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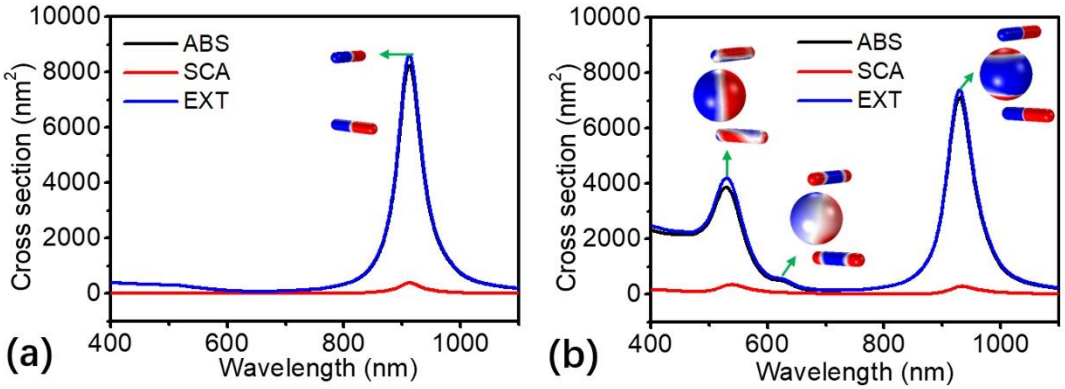


**Figure S1.** Extinction cross sections of NR-NR structure (a) and NR-NP-NR complexes (b), excited with linearly polarized light propagating along the z-axis, the polarization direction is the bisector direction between the x- and y-axes. The insets show the surface charge density distributions at the various resonance peaks. Absorption spectra: black lines; Scattering spectra: red lines; Extinction spectra: blue lines.

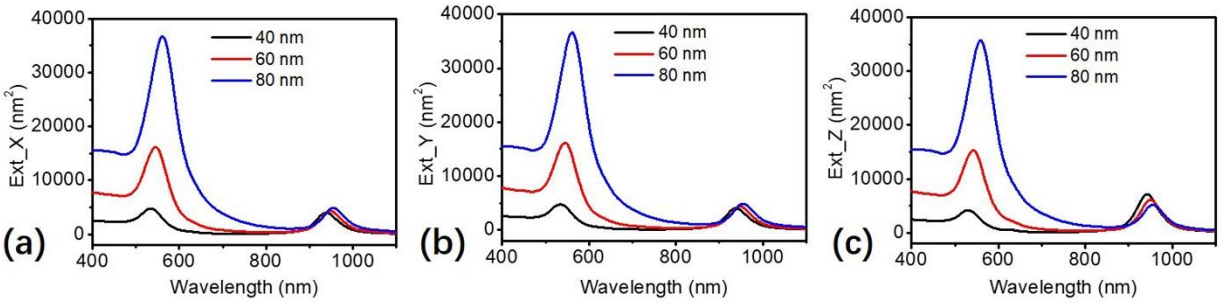


**Figure S2.** Extinction spectra of NR-NP-NR complex with different diameter of nanoparticles excited with LCP propagating along the x-axis (a), y-axis (b), and z-axis (c). D=40 nm (black lines), 60 nm (red lines), 80 nm (blue lines).

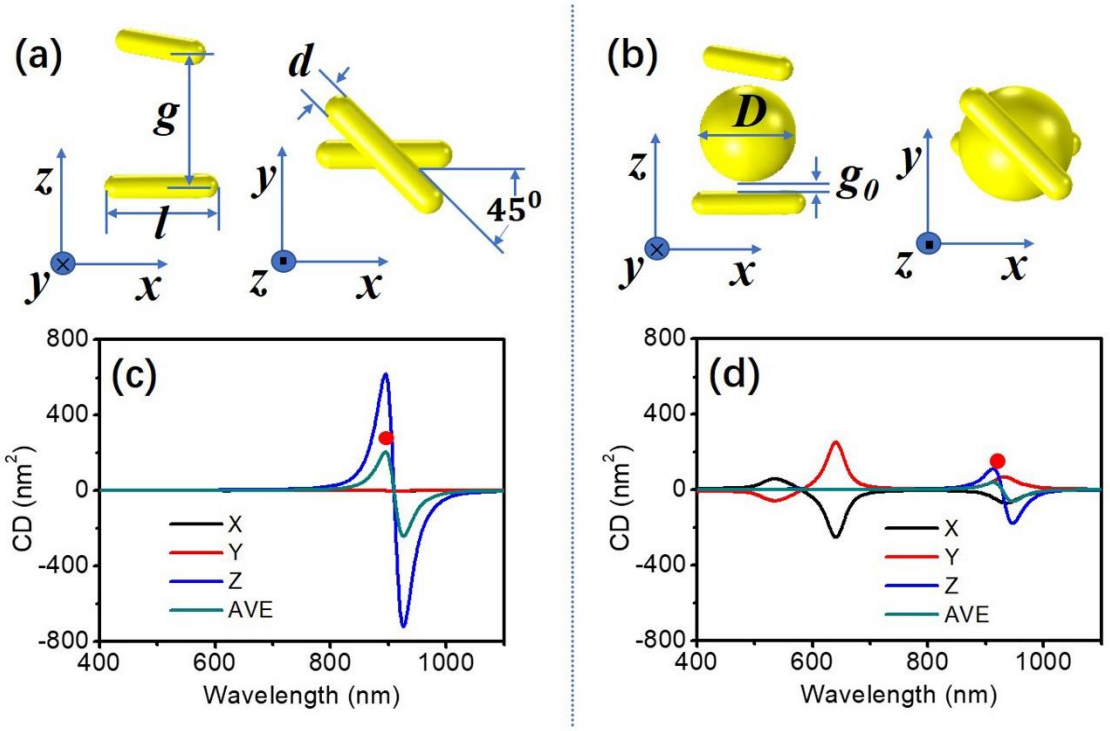


**Figure S3.** Schematics of a crossed NR dimer (NR-NR) (a) and a NR-NP-NR complex (b), as seen from different sides (left: side view, right: Top view), with labeled structural parameters. l=48 nm, d=10 nm, g=60 nm, $g_0$=5 nm, D=40 nm. CD spectra of NR-NR structure (c) and NR-NP-NR complex (d) excited from different directions. X (black lines), Y (red lines) and Z (blue lines), Averaged CD (dark cyan lines).

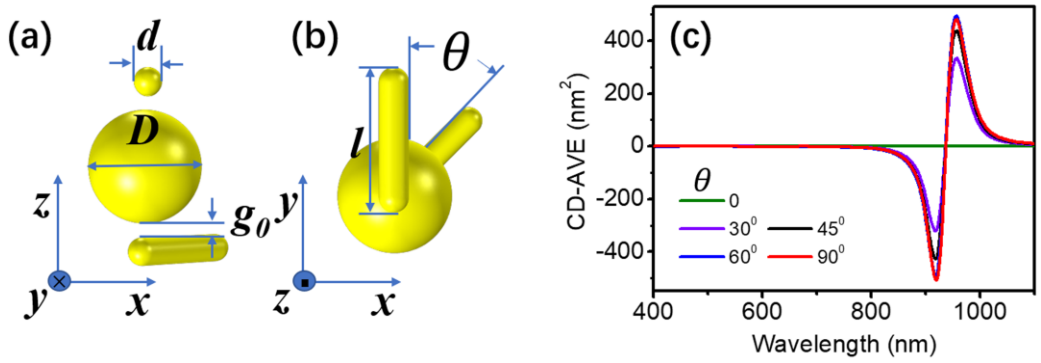


**Figure S4**. Schematics of the NR-NP-NR complex with different angles between two nanorods and their CD spectra. (a) Side view of NR-NP-NR complex; (b) Top view of NR-NP-NR complex;

(c) Averaged CD spectra of the NR-NP-NR complex with different angles θ: θ =0 (green line), $30^0$ (purple line), $45^0$ (black line), $60^0$ (blue line), $90^0$ (red line)). l=48 nm, d=10 nm, $g_0$=5 nm, D=40 nm.

From Figure S3, we show the geometry in which the center of the nanoparticle is placed on the line connecting the middles of the two nanorods. Interestingly, in this geometry, the long-range chiral transfer does not appear since the symmetry of the NR-NP pairs inside the complex is too high. In fact, this geometry leads to a decrease of the CD signal of the assembly due to the screening effect coming from the central NP. In other words, the NP does not play the role of a transmitter in this case. This example shows that the CD transfer needs special designs. In particular, the symmetry of the NR-NP pairs inside the NR-NP-NR complex should be as low as possible. In the case of the crossed NRs in Figure S3, the NR-NP pair has the symmetry with an inversion center. For the complex, which includes the NR pair with the 90deg angle in the main text and the center of NP is positioned at one end of the NR, the NR-NP pairs in a complex is of lower symmetry with no inversion center. We also add that, in both cases (Figure 2c and Figure S3b), the NR-NP pairs are achiral objects themselves. Then, chirality in both cases comes from adding a second NR.

But it is worth noting that the 90deg angle of two NRs is not necessary for the chiral transfer effect. From Figure S4, we can see that there are chiral transfer and enhancement with different angles ($\theta$) between two NRs. For $\theta = 0$, CD is zero, of course, since the system is not chiral. When $\theta$ increases from $30^0$ to $60^0$, the chiral response grows because the system becomes more chiral geometrically. However, for the further increase of the angle from $60^0$ to $90^0$, the change of chiral response is not strong.