SUPPORTING INFORMATION for

Fano Interference of Electromagnetic Modes in Subwavelength Dielectric Nanocrosses

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1. Calculations for individual NB_1 and NB_2 with mutipole decomposition approach.

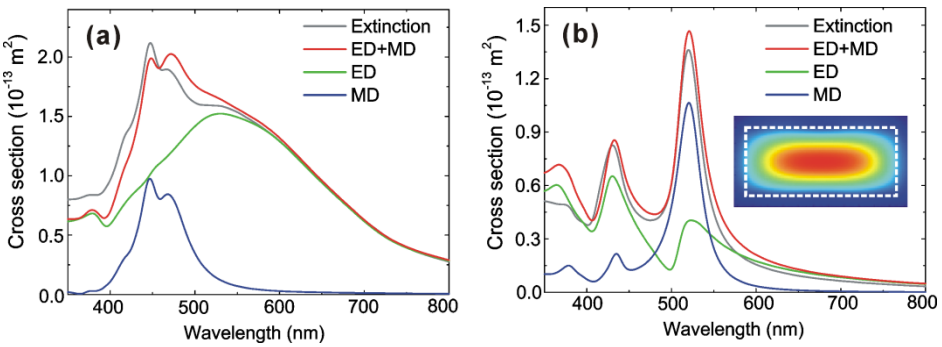

Figure S1. The cases for individual NB_1 and NB_2 are shown in (a) and (b), respectively. Here, each of the NB_1 and NB_2 is the same as that in Figure 1 in main text. In each of the figures (a) and (b), the electric dipole and magnetic dipole contributions are shown by green and blue lines, respectively. The red and gray lines show the total extinction cross section from the sum of the multipoles mentioned above and the FDTD simulation, respectively. The inset in (b) shows the magnetic field enhancement distribution near the magnetic dipole position λ = 520 nm (the dashed white line shows the NB_2 structure cross section).

2. Electric and magnetic near field vector distributions near the Fano dip.

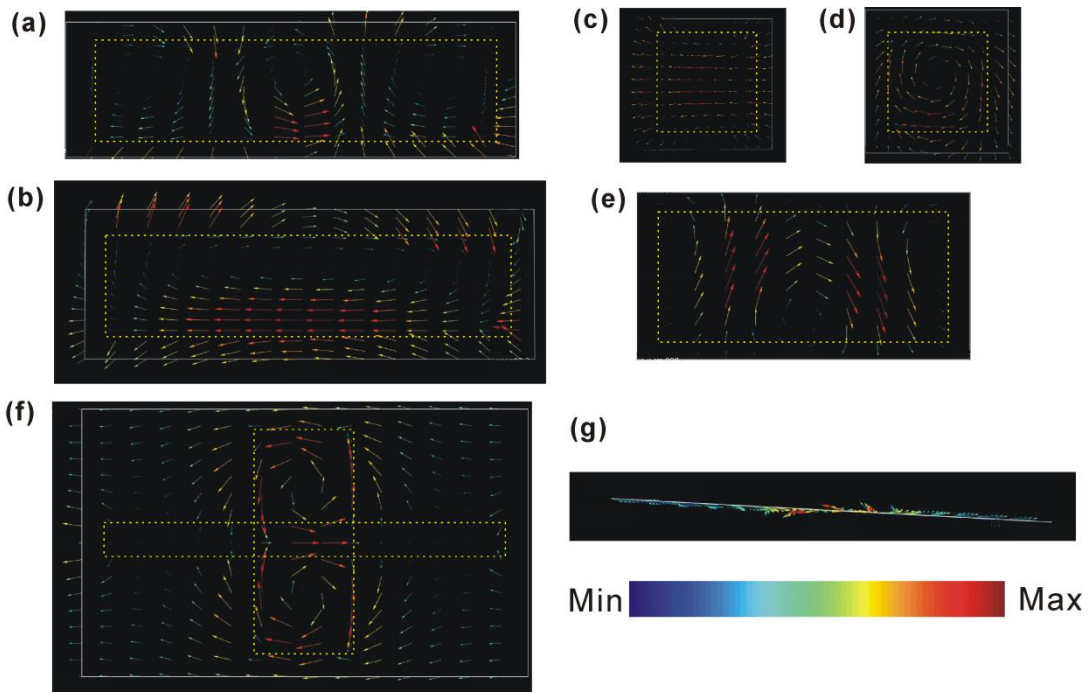

Figure S2. The electric field vector distribution on the y = 0 plane at λ = 505 nm for the nanocross, individual NB_1 and NB_2 are shown in (a), (b) and (c), respectively. (d) The same plot for the individual NB_2 but the excitation configuration now is the same as that in Figure 1c in main text. (e) The magnetic field vector distribution of the nanocross on the x = 0 plane with λ = 505 nm. The magnetic field vector distribution of the nanocross at λ = 505 nm on the z = 0 plane with top and side views are shown in (f) and (g), respectively. In each figure, the color of the arrow denotes the magnitude of the field vector, where the blue and red means minimum and maximum value, respectively (the color bar is shown by the inset). The color bars for field vector distributions for other cases discussed below have the same meaning, which will not be specified there. The dashed yellow lines show structure cross sections.

3. Electric and magnetic near field vector distributions for constructive field couplings.

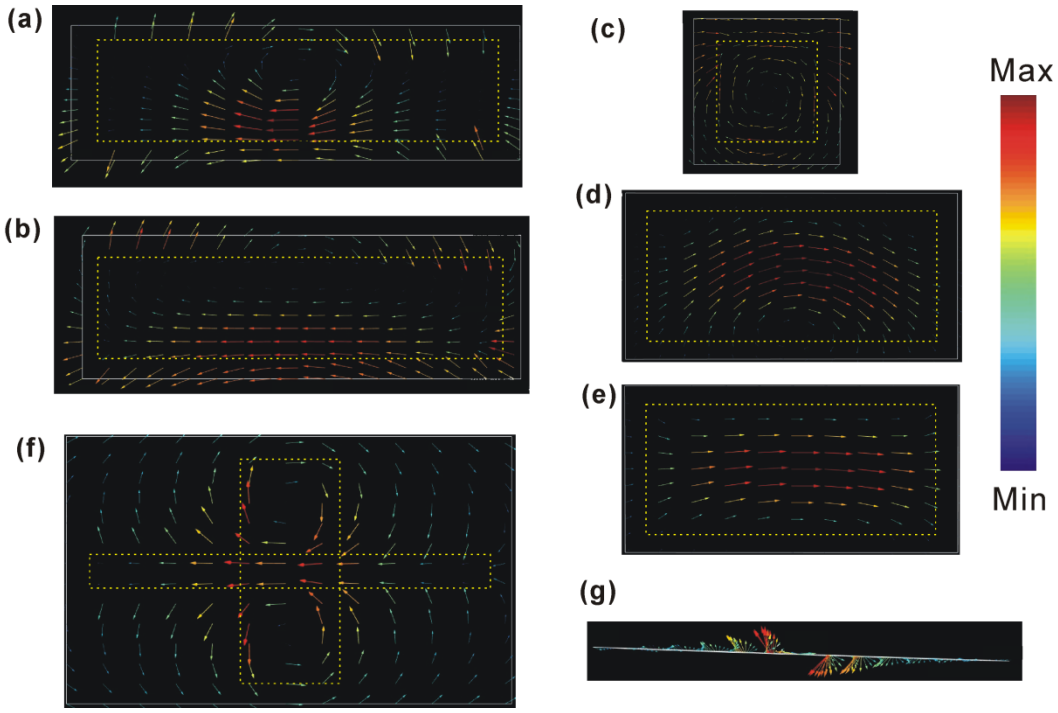

Figure S3. The electric field vector distributions on the y = 0 plane at λ = 555nm for the nanocross, individual NB_1 and NB_2 are shown in (a), (b) and (c), respectively. The magnetic field vector distributions on x = 0 plane at λ = 555nm for the nanocross and individual NB_2 are shown in (d) and (e), respectively. The magnetic field vector distribution for the nanocross at λ = 555 nm on the z = 0 plane with top and side views are shown in (f) and (g), respectively. The dashed yellow lines show structure cross sections.

4. Fano resonance spectra for separated NB_1 and NB_2 with d = 10 nm and near field distributions around the Fano dip.

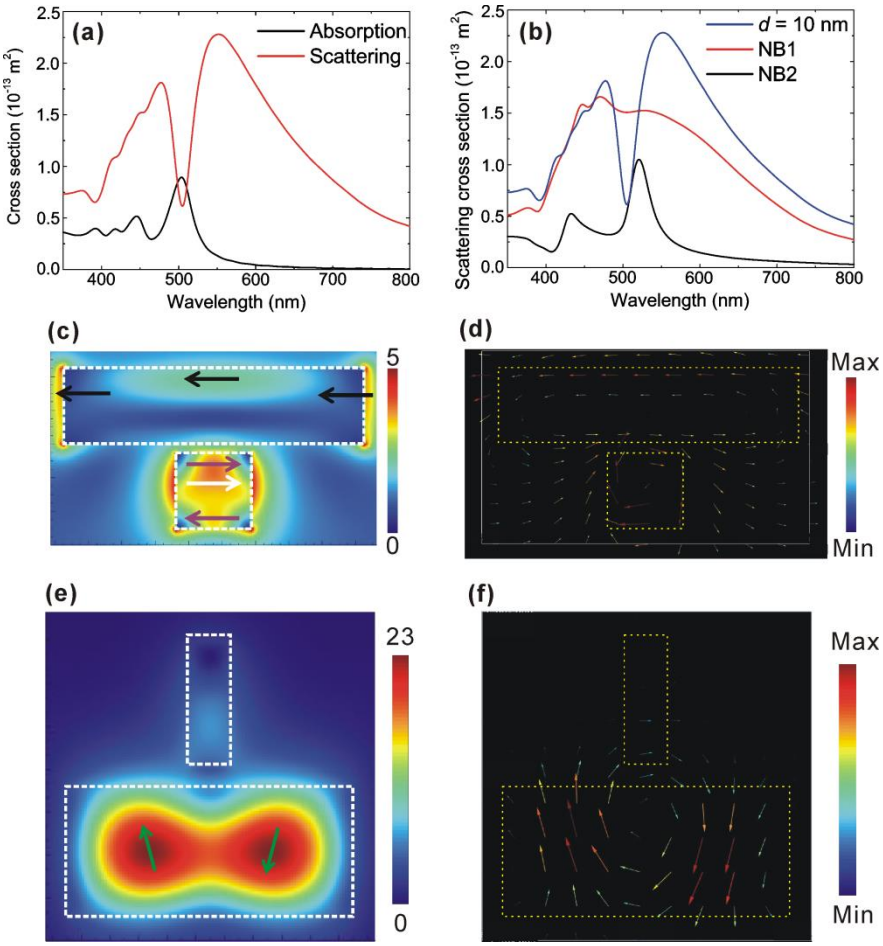

Figure S4. (a) The scattering and absorption cross section spectra of the structure with d = 10 nm. (b) Scattering spectra for the coupled structure and individual NB_1 and NB_2 with the same source excitation configuration. (c) The electric field $|\mathbf{E}|$ distribution on the y = 0 plane at λ = 505nm. The arrows show the electric field directions. (d) The electric field vector distribution on the y = 0 plane at λ = 505nm. (e) The magnetic field $|\mathbf{H}|$ distribution on the x = 0 plane with λ = 505 nm, the arrows show the magnetic field directions. (f) The magnetic field vector distribution on the x = 0 plane with λ = 505 nm. The dashed yellow and white lines in (c)-(f) show structure cross sections.

5. Electric and magnetic near field distributions with constructive couplings for separated NB_1 and NB_2 structure with d = 10 nm.

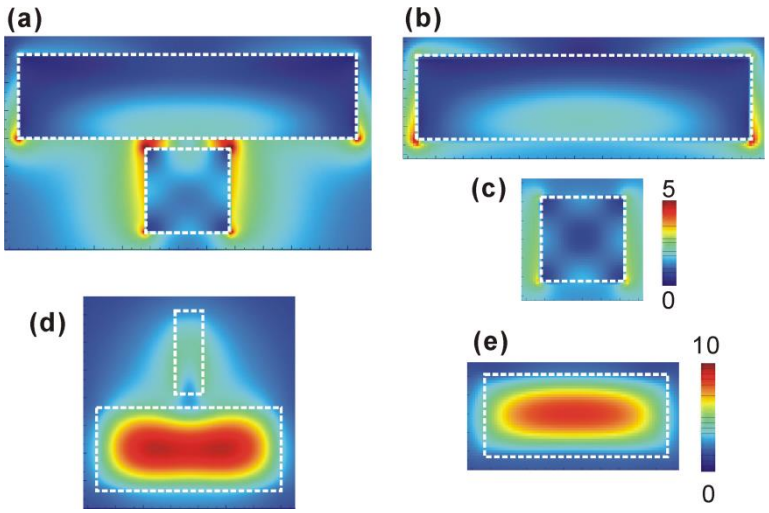

Figure S5. The electric field $|\mathbf{E}|$ distribution on the y = 0 plane at λ = 555nm for the coupled structure, individual NB_1 and NB_2 are shown in (a), (b) and (c), respectively. The magnetic field $|\mathbf{H}|$ distribution on x = 0 plane at λ = 555nm for the coupled structure and individual NB_2 are shown in (d) and (e), respectively.

6. The scattering spectra for individual NB_2 with different geometry parameters.

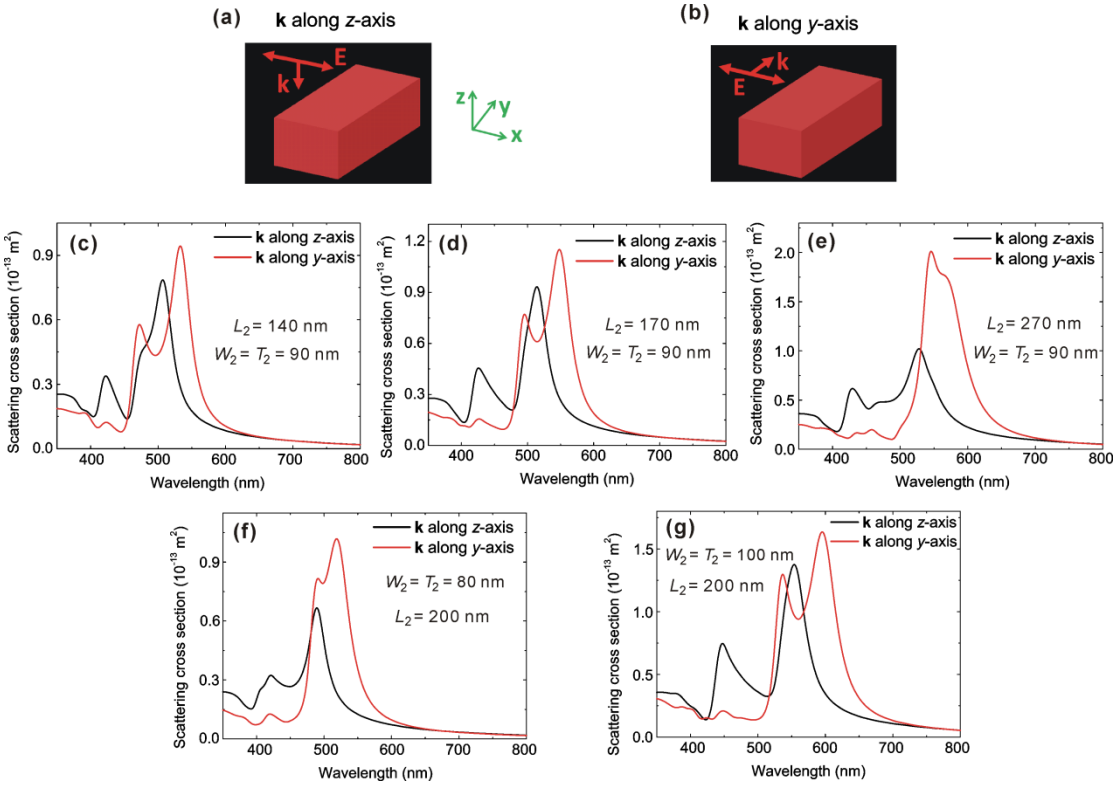

Figure S6. The schematics of an individual NB_2 excited by a plane wave with wave vector **k** along *z*-axis and *y*-axis are shown in (a) and (b), respectively. The scattering spectra with the two excitations for individual NB_2 with L_2 = 140, 170 and 270 nm are shown in (c), (d) and (e), respectively. Here, the width and thickness are both fixed at 90 nm (W_2 = T_2 = 90 nm). The scattering spectra with the two excitations for individual NB_2 with W_2 = T_2 = 80 and 100 nm are shown in (f) and (g), respectively. Here, the length is fixed at L_2 = 200 nm.

7. The scattering spectra for nanocross with L_1 = 550 nm and individual NB_1 with different geometry parameters.

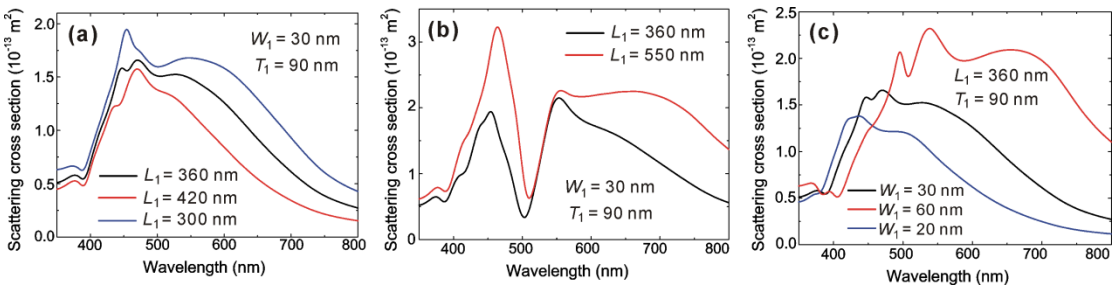

Figure S7. (a) The scattering spectra for individual NB_1 with length L_1 = 360, 420 and

300 nm. The width and thickness are fixed at 30 and 90 nm, respectively. (b) The scattering spectra for the nanocrosses with length L_1 = 360 and 550 nm. The width and thickness are fixed at 30 and 90 nm, respectively. (c) The scattering spectra for individual NB_1 with width W_1 = 30, 60 and 20 nm. The length and thickness are fixed at 360 and 90 nm, respectively.

8. The scattering spectra for nanocross on substrates.

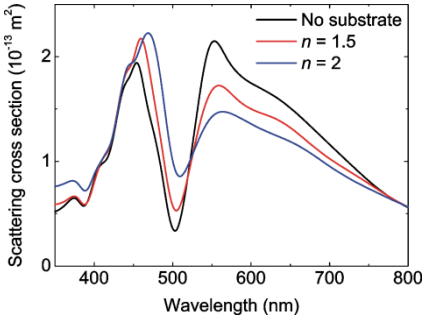

Figure S8. The scattering spectra for nanocross placed on substrate with n = 1.5 and 2. The case for nanocross without substrate is also shown for comparison. The nanocross is the same as that in Figure 2 in main text.