Electronic Supplementary Material (ESI) for Materials Advances.

Supplementary Information

Engineering chiral plasmonic nanostructures for gain-assisted plasmon amplification and tunable enhancement of circular dichroism

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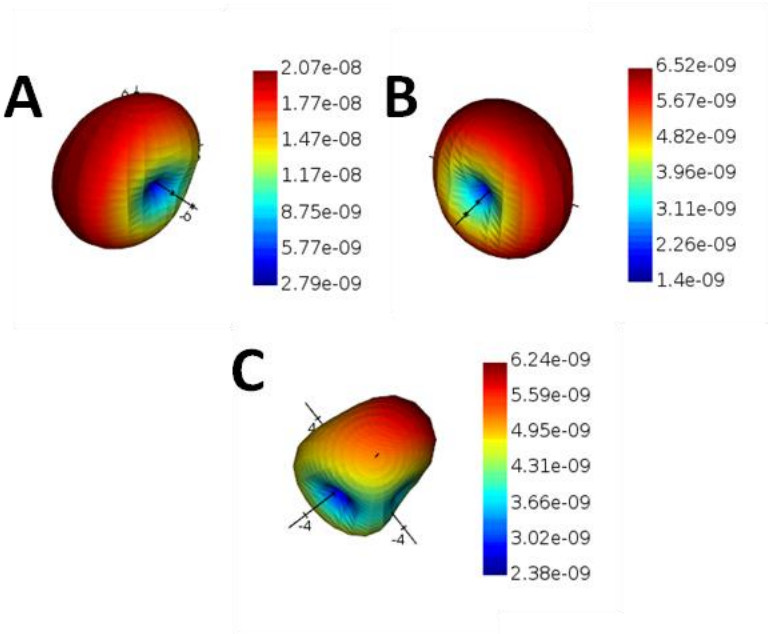

Figure S1: Calculated far-field profiles of the gold nanorod dimer-1. (A) Dimer excited by RCP at anti-bonding wavelength of 709 nm, and at bonding wavelength of 774 nm (B). (C) Off resonance excitation at 650 nm of the gold nanorod dimer.

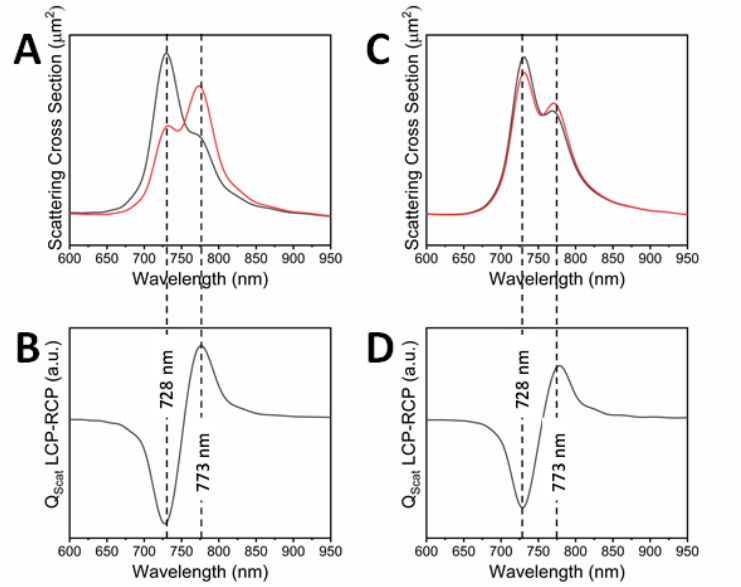

Figure S2: The circular dichroism spectra (for dimer-2) emerging from the difference between the scattering of LCP (black) and RCP (red) light (A) at normal incidence and (C) at oblique incidence giving rise to a bisignate form of the spectrum (B) at normal incidence and (D) at oblique incidence.

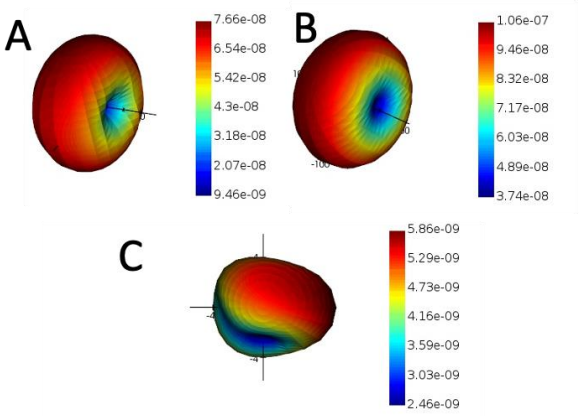

Figure S3: Calculated far-field profiles of the gold nanorod dimer-1 with a gain medium of thickness 5 nm with a critical k value of 0.104. (A) Dimer excited by LCP at anti-bonding wavelength, and at bonding wavelength (B). (C) Off resonance excitation at 650 nm of the gold nanorod dimer with 5nm coating of gain medium.

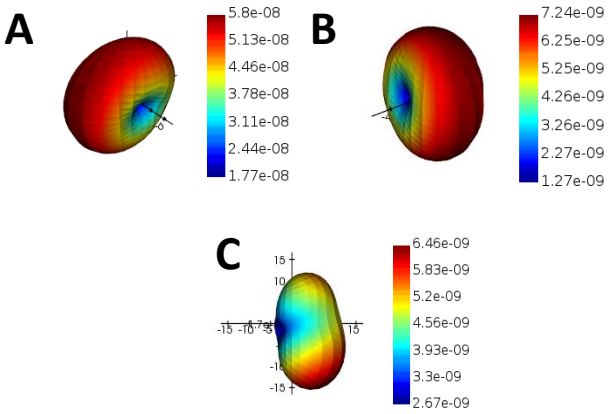

Figure S4: Calculated far-field profiles of the gold nanorod dimer-1 with a gain medium of thickness 5 nm with a critical k value of 0.104. (A) Dimer excited by RCP at anti-bonding wavelength, and at bonding wavelength (B). (C) Off resonance excitation at 650 nm of the gold nanorod dimer with 5nm coating of gain medium.

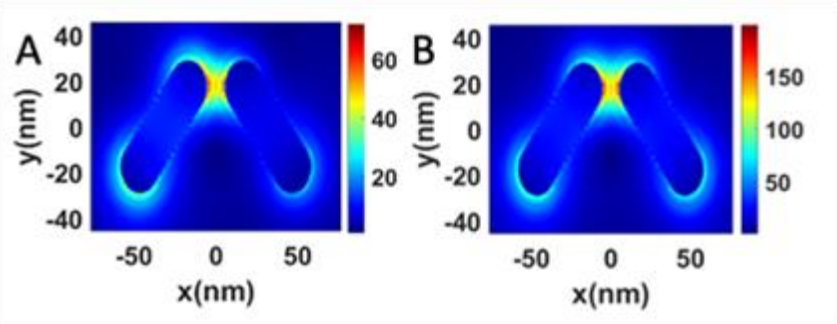

Figure S5: (A) Near-field intensity of 5 nm silica coated v-shaped nanorod assembly (dimer-1), and (B) when the gain coefficient, k of the silica layer is at its critical value of 0.104. The excitation was through LCP light at bonding wavelengths.

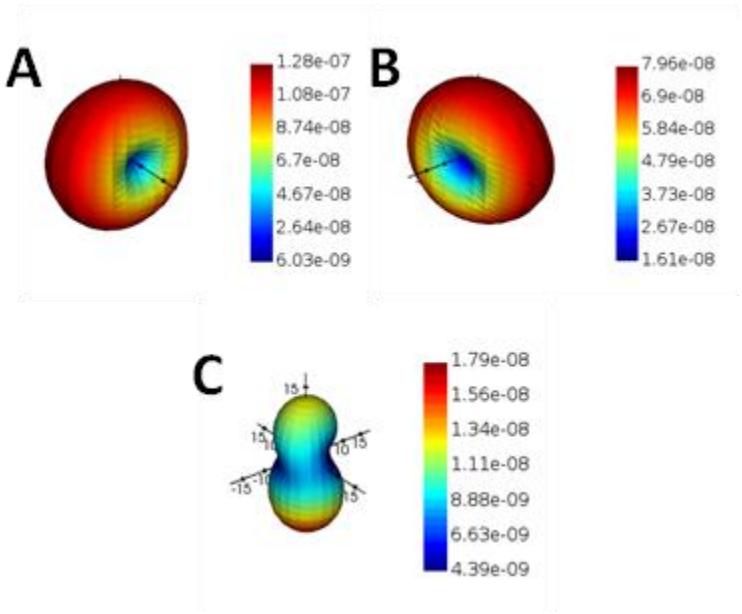

Figure S6: Calculated far-field profiles of the gold nanorod dimer-2 (angle of incidence 0 degree) with a gain medium of thickness 5 nm with a critical k value of 0.150. (A) Dimer excited by LCP at anti-bonding wavelength (728 nm), and at bonding wavelength (773 nm) (B). (C) Off resonance excitation at 600 nm of the gold nanorod dimer with 5nm coating of gain medium.

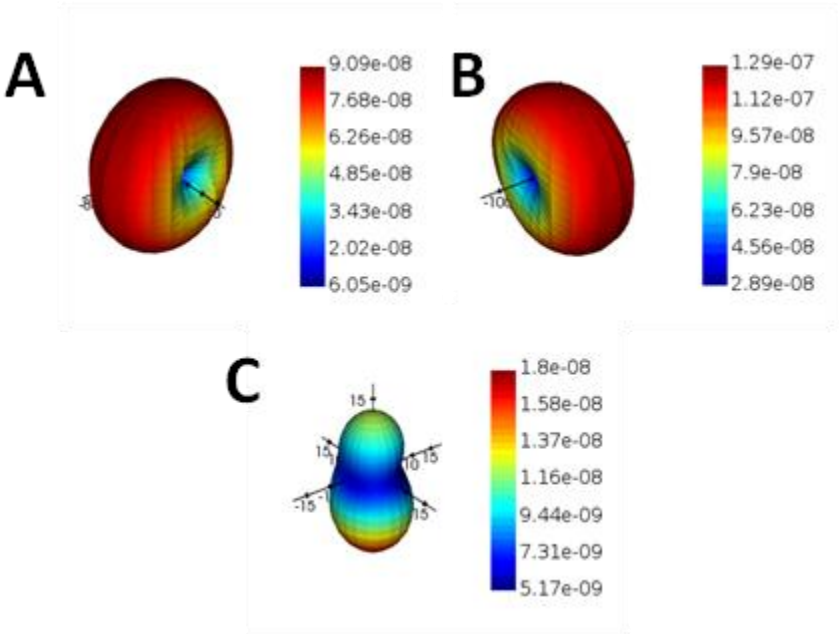

Figure S7: Calculated far-field profiles of the gold nanorod dimer-2 (angle of incidence 0 degree) with a gain medium of thickness 5 nm with a critical k value of 0.150. (A) Dimer excited by RCP at anti-bonding wavelength (728 nm), and at bonding wavelength (773 nm) (B). (C) Off resonance excitation at 600 nm of the gold nanorod dimer with 5nm coating of gain medium.

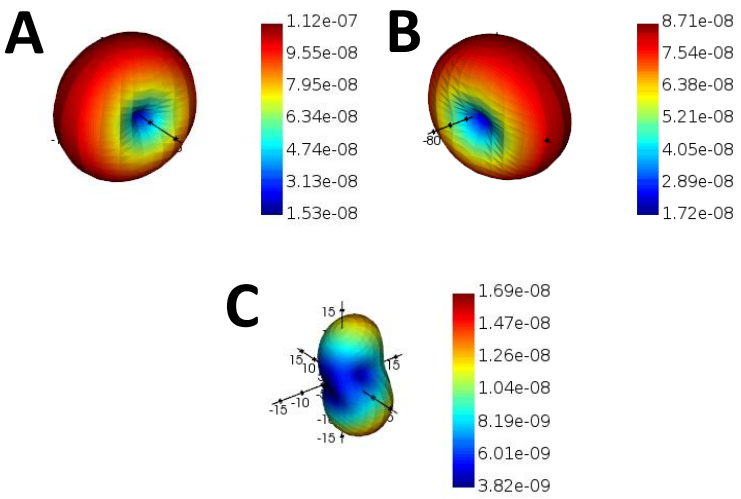

Figure S8: Calculated far-field profiles of the gold nanorod dimer-2 with a gain medium of thickness 5 nm with a critical k value of 0.147. (A) Dimer excited by LCP at anti-bonding wavelength (728 nm), and at bonding wavelength (773 nm) (B). (C) Off resonance excitation at 600 nm of the gold nanorod dimer with 5nm coating of gain medium.

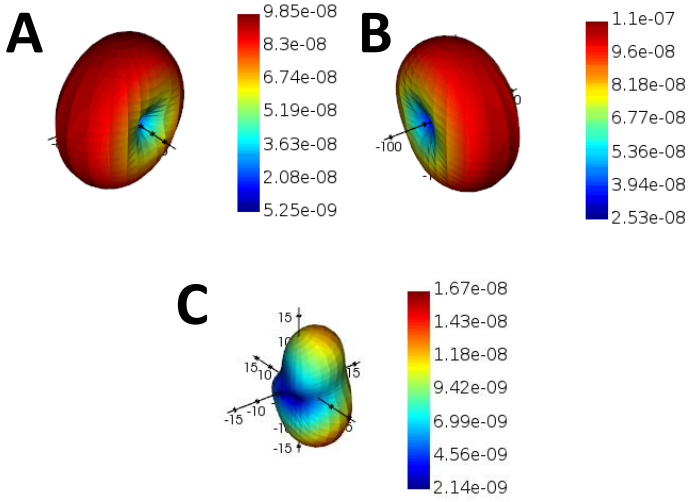

Figure S9: Calculated far-field profiles of the gold nanorod dimer-2 with a gain medium of thickness 5 nm with a critical k value of 0.147. (A) Dimer excited by RCP at anti-bonding wavelength (728 nm), and at bonding wavelength (773 nm) (B). (C) Off resonance excitation at 600 nm of the gold nanorod dimer with 5nm coating of gain medium.

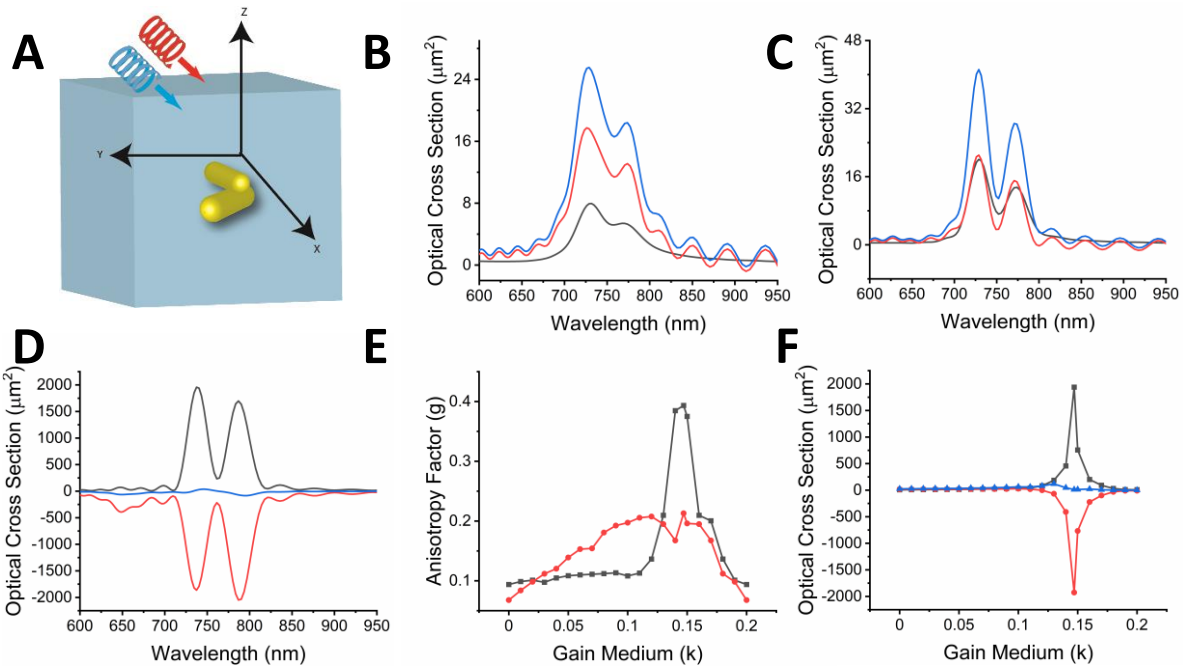

Figure S10: The simulation setup showing the twisted gold nanorod assembly showing intrinsic chirality (dimer-2). Figures (B-D) represents absorbance, scattering and extinction of nanorod systems with k values of 0, 0.07 and 0.147 respectively. Calculated absorbance (red), scattering (black) and extinction (blue) are shown for a gold nanorod dimer system immersed in water and with right circularly polarized light incident at oblique incidence of 60°. (E) The calculated anisotropy factor (g) with different k values. The black and red curves show the trend of bonding and anti-bonding modes respectively. (F) The calculated optical cross-section as a function of different values of k-values around the critical point of 0.147.

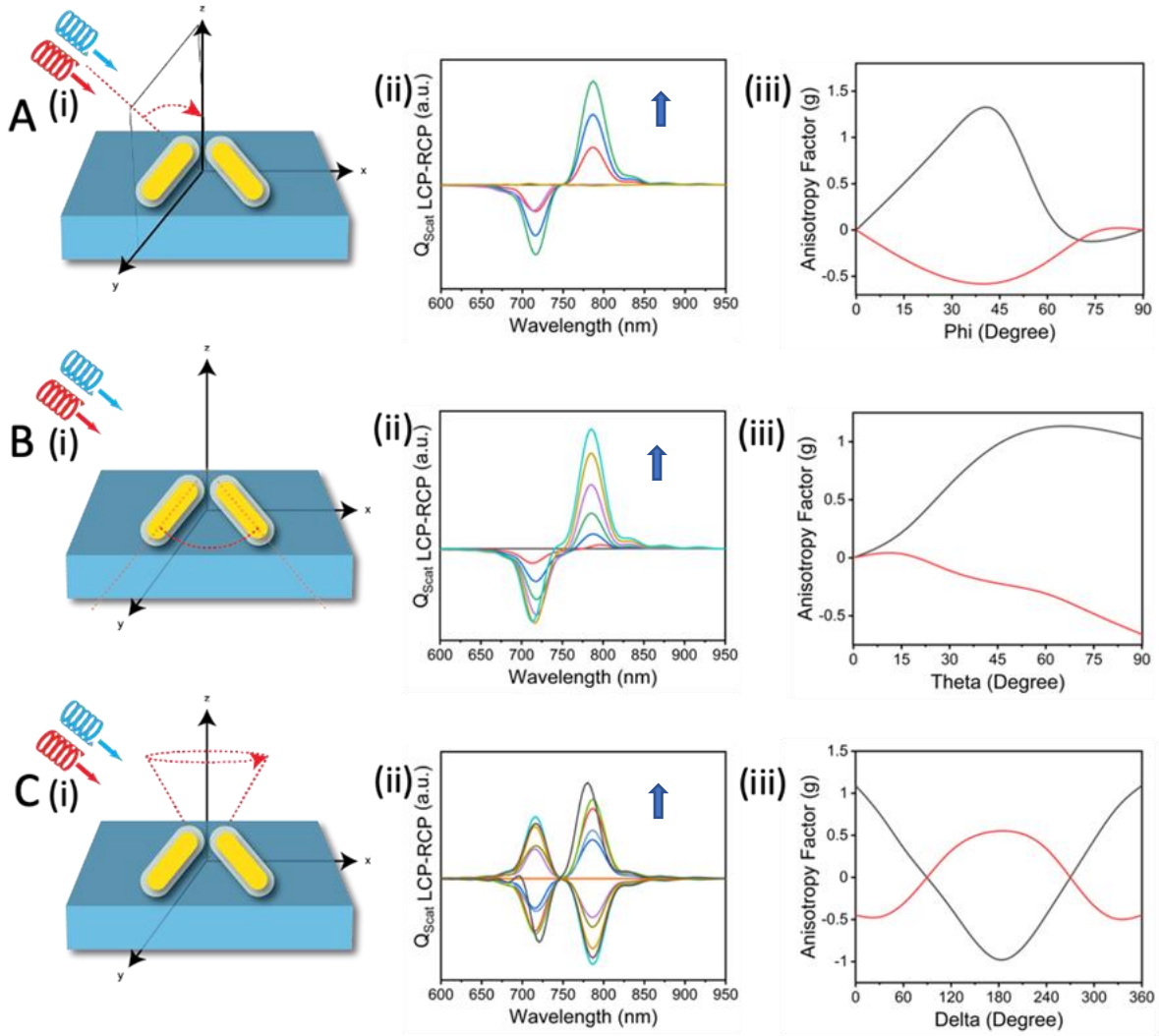

Figure S11: The variation of CD signals with various angles of incidence of LCP and RCP light and also the angle between the gold nanorods with 5 nm gain medium at critical value of gain coefficient k. The arrow represent that the value of Q_{scat} is increasing in that direction from 0 to 0.104.