

## Supporting information

### Surface Plasmon Coupling in End-to-End Linked Gold Nanorod Dimers and Trimers

Jatish Kumar <sup>a</sup>, Xingzhan Wei <sup>b</sup>, Steven Barrow <sup>b</sup>, K George Thomas <sup>a</sup>, Alison Funston <sup>c</sup>,  
Paul Mulvaney <sup>b\*</sup>

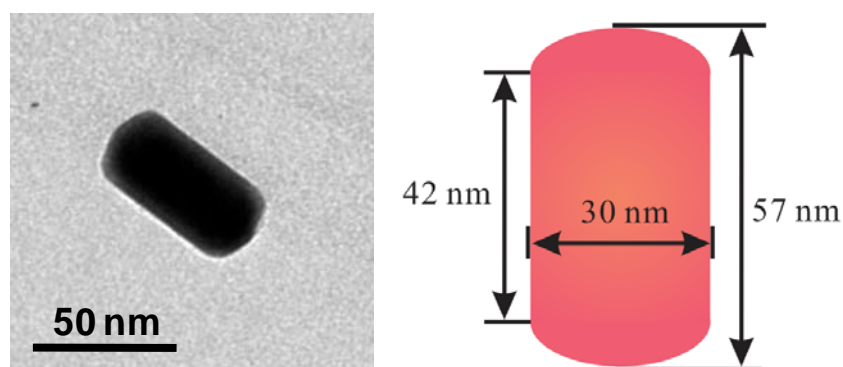


Figure S1. TEM image and schematic representation of a gold nanorod with relevant modelling parameters.

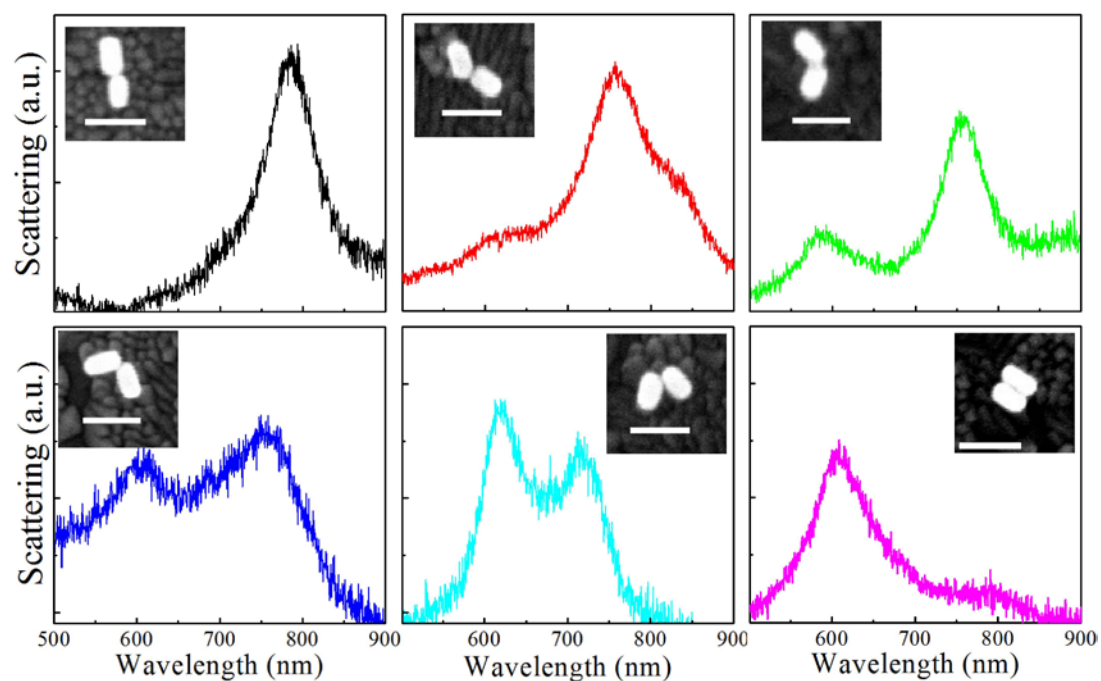


Figure S2. Non-polarized scattering spectra of nanorod dimers with varying angles ( $176 \pm 3^\circ$ ,  $153 \pm 3^\circ$ ,  $117 \pm 3^\circ$ ,  $93 \pm 3^\circ$ ,  $52 \pm 3^\circ$  and  $0 \pm 0.5^\circ$ ). Inset shows the corresponding SEM image of the dimers. Scale bars = 100 nm.

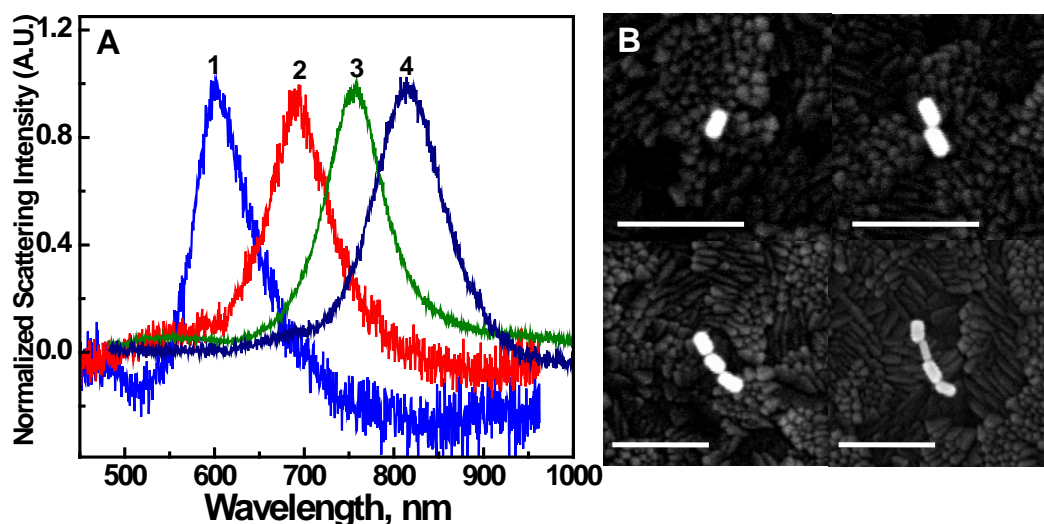


Figure S3. (A) Normalized scattering spectra and (B) the corresponding SEM images of self-assembled chains of Au nanorods with aspect ratio 1.7. Spectra were collected on an ITO coated glass substrate. The numbers indicate the number of nanorods in the chain. Scale bars = 250 nm.

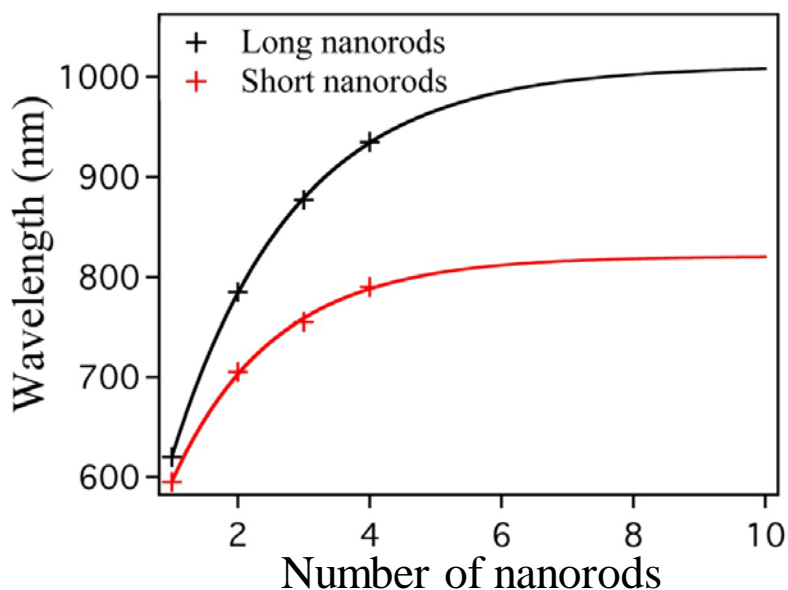


Figure S4. Maximum wavelength of the coupled longitudinal plasmon band as a function of the number of nanorods in the nanochain. Nanorods having an aspect ratio of 1.7 and 2.0 are represented by red and black lines, respectively. The maximum wavelength was taken from Figures 2 and S3, and the curves were obtained using an exponential fit.

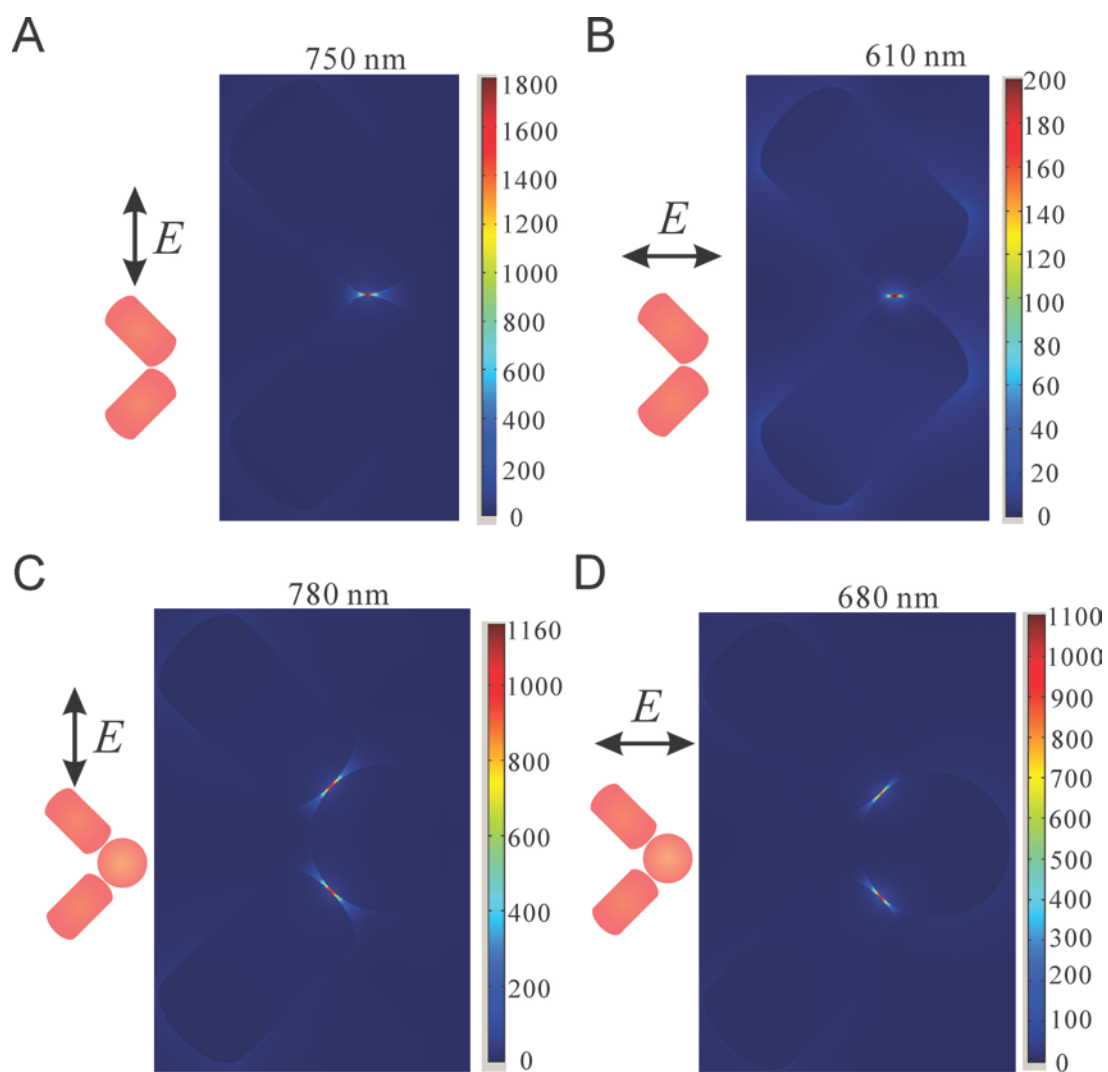


Figure S5. Maps of the near-field electric field strength for the nanorod dimer (A, B) and rod-sphere-rod trimer (C, D) at their relevant plasmon peak wavelengths. The angles between the nanorods for both structures are 90 degrees. (A) and (C) Bonding mode observed in the low energy region under vertical polarization; (B) and (D) anti-bonding mode observed in the high energy region under horizontal polarization.

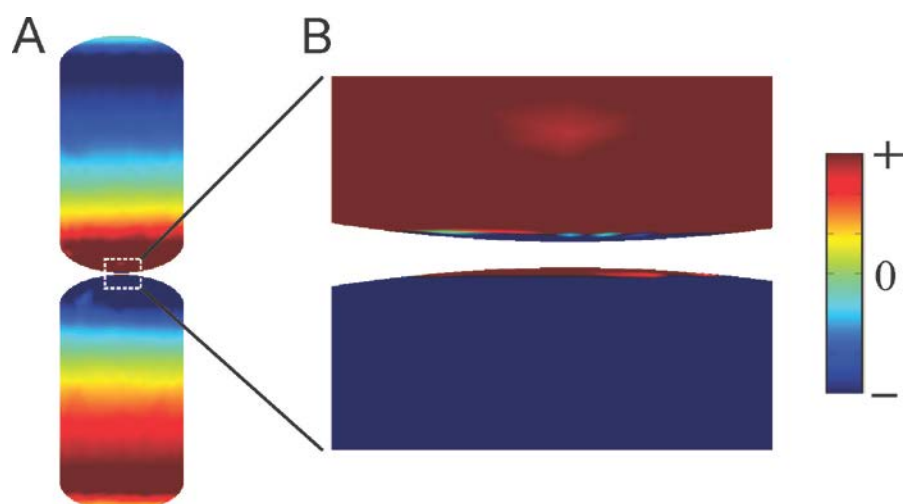


Figure S6. (A) Surface charge distributions at 600 nm for the nanorod dimer structure. The magnification of the mode confirms that the coupling is between quadrupolar modes. (B) Enlarged view of the dimer junction.