Electronic Supplementary Material (ESI) for Nanoscale Horizons.

Supporting Information

Far-field plasmonic coupling in 2-dimensional polycrystalline plasmonic arrays

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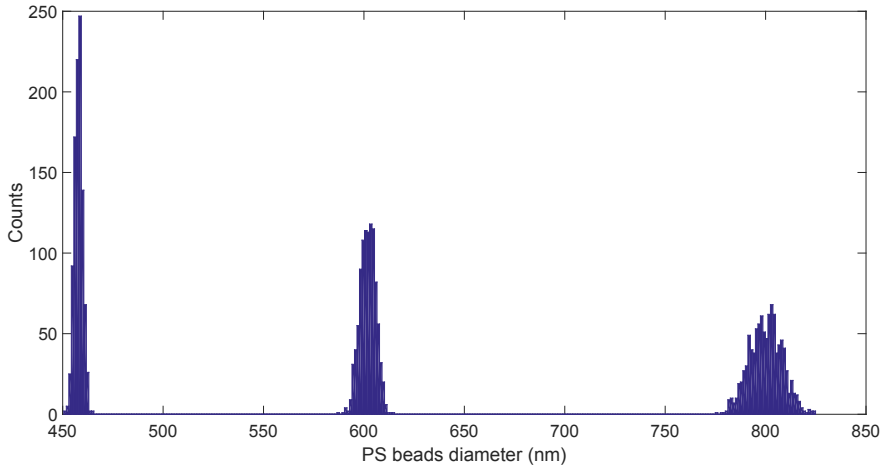

Figure S1. Histogram of the diameter distribution of the 3 types of PS beads used in the experiments. Data obtained by analyzing SEM images of PS beads monolayer, for each diameter ~1000 PS beads are analyzed. The standard deviation is roughly 1% of the corresponding diameter.

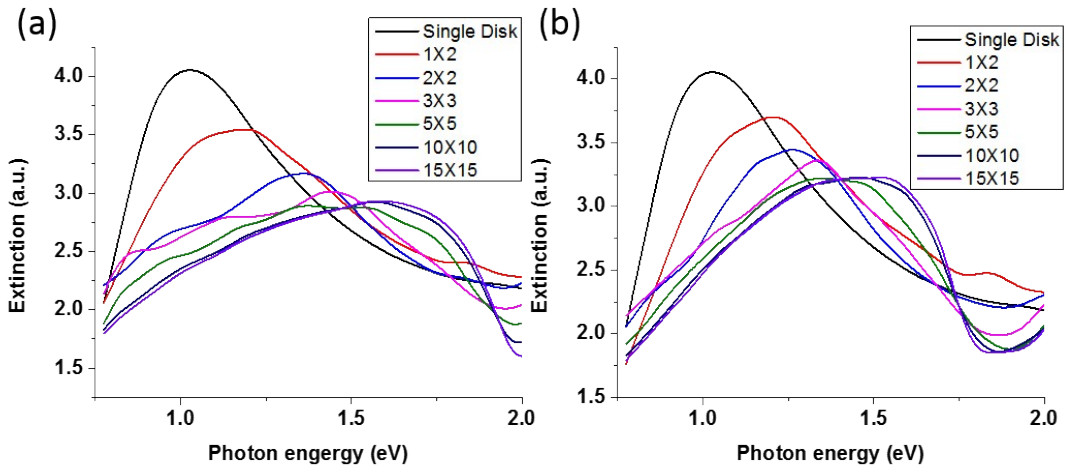

Figure S2. Simulated array with hexagonal packing (a) and rectangular packing (b). The simulations are done with arrays consisting 1-225 AuNDs with 350nm diameter, 80nm thickness and CDR of 1.3. The 1X2 simulation was done with the particles arranged in the direction perpendicular to the polarization of the incident light. The asymmetry in the

spectra is caused by lattice plasmon resonance in a refractive index mismatched environment.[1] With increasing numbers of AuNDs being simulated the coupling strength increase and saturates with more than 100 AuNDs, indicates such array is capable of representing coupling in an infinite array.

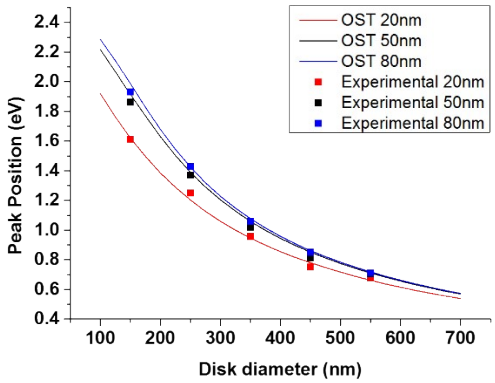

Figure S3. Experimentally obtained peak position for different single AuND plotted with OST calculated results.

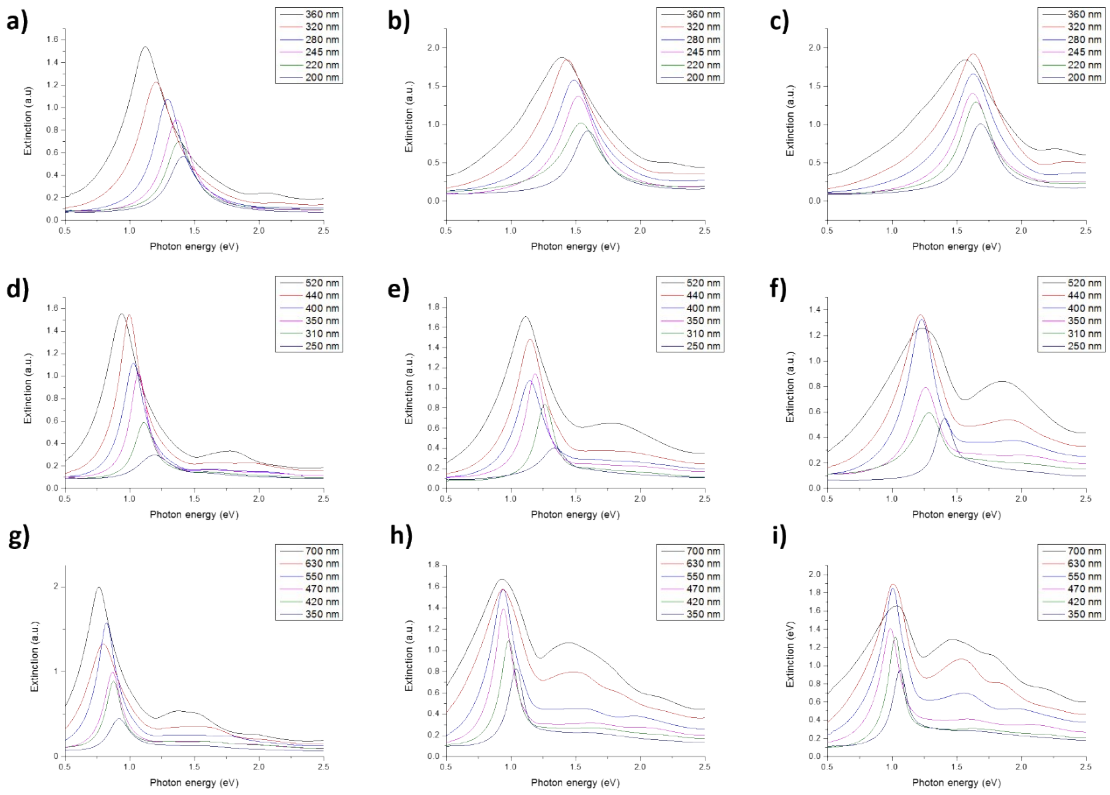

Figure S4. Extinction spectra of AuND arrays made from (a) 460 nm PS beads with 20 nm thickness. (b) 460 nm PS beads with 50 nm thickness. (c) 460 nm PS beads with 80 nm thickness. (d) 600 nm PS beads with 20 nm thickness. (e) 600 nm PS beads with 50 nm thickness. (f) 600 nm PS beads with 80 nm thickness. (g) 800 nm PS beads with 20 nm thickness. (h) 800 nm PS beads with 50 nm thickness. (i) 800 nm PS beads with 80 nm thickness.

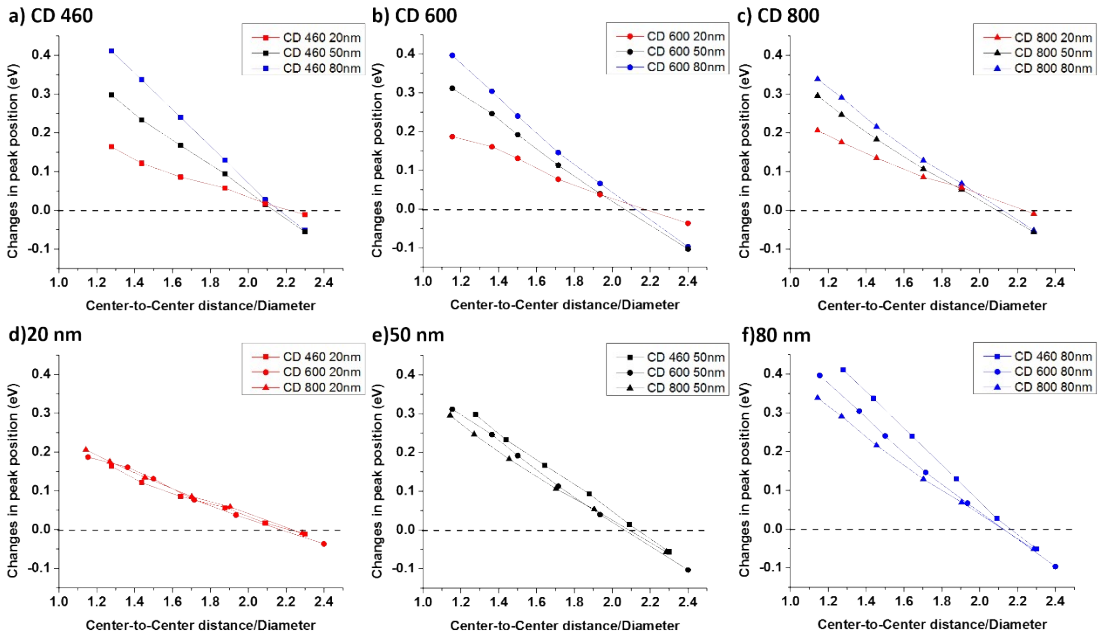

Figure S5. Data from Fig. 2c plotted in subsets with various CDs and disk thicknesses.

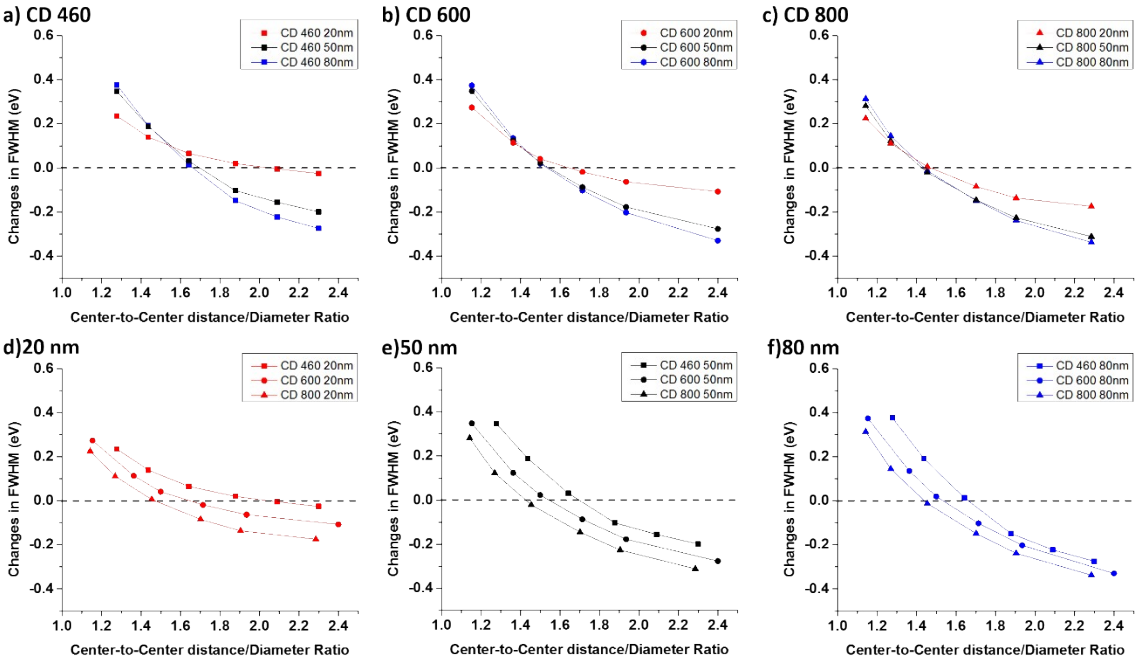

Figure S6. Data from Fig. 4c plotted in subsets with various CDs and disk thicknesses.

References

1. Auguie, B.; Barnes, W. L., Collective resonances in gold nanoparticle arrays. *Physical review letters* **2008,** *101* (14), 143902.