Supporting information for

“Scalable Manufacturing of Plasmonic Nanodisk Dimers and Cusp Nanostructures using Salting-out Quenching Method and Colloidal Lithography”

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S1. Determination of minimum oxygen etching time

We observed that for etching times until 25 sec, the gap between polystyrene particles were not opened up completely as shown in Figure S1. Therefore a minimum etching time of 30 sec was used.

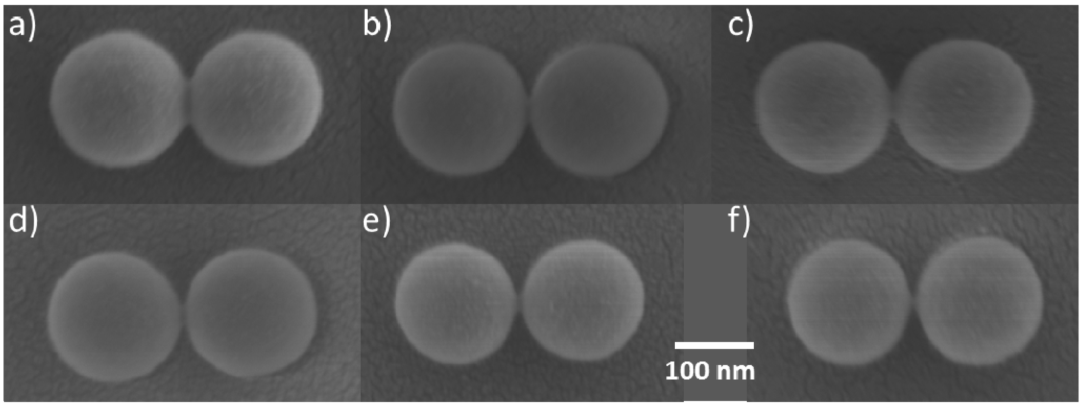

Figure S1: FESEM images of polystyrene beads for an etching time of a) 2.5 sec, b) 5 sec , c) 10 sec, d) 15 sec, e) 20 sec and f) 25 sec.

S2. Effect of heterogeneity on plasmon resonances and electric fields in doublet bead diameters

Variation in the diameter of the beads forming doublets will result in dimers with nanodiscs of different diameters. FDTD calculations are performed on nanodisc dimers to study the effect of such heterogeneity on plasmon resonances and electric fields. These results are shown in Figure S2.

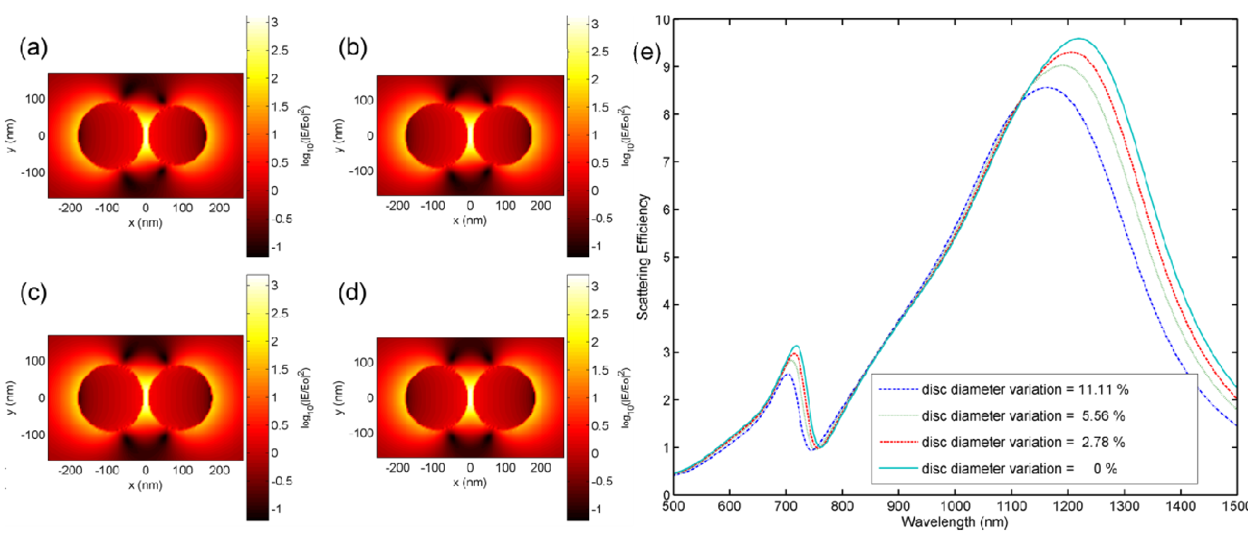

Figure. S2. Electric field distribution in disc dimers at plasmon resonance for varying degree of disc diameter heterogeneity at constant gap, (a) 11.11% variation (right side disc diameter = 160 nm, left side disc diameter = 180 nm), (b) 5.56% (right side disc diameter = 170 nm, left side disc diameter = 180 nm), (c) 2.78% (right side disc diameter = 175 nm, left side disc diameter = 180 nm) and (d) 0% (right and left side disc diameter = 180 nm). (e) Scattering efficiency spectra for various disc diameter heterogeneity.

S3. Effect of film thickness on plasmon resonances in nanodisc dimers

The plasmon resonances of nanodisc dimers can be tuned by changing the thickness of the metal thickness. This is verified by FDTD calculations (as shown in Figure S3). For a certain dimer gap, the plasmon resonances redshifts for thinner metal films.

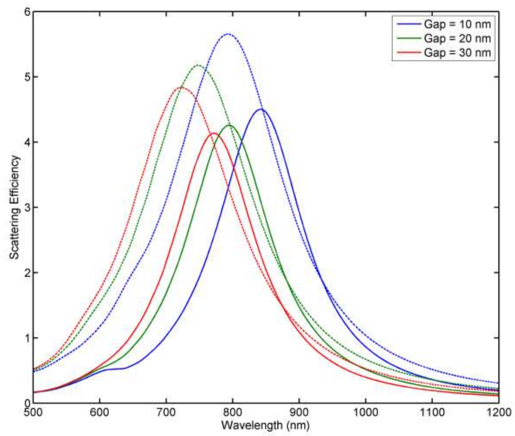

Figure. S3. Scattering efficiency *vs.* wavelength for nanodisc dimers of 30 nm (solid lines) and 60 nm thickness (dotted lines). The disc diameter is chosen to be 180 nm and gap varies from 10 to 30 nm.

S4. Effect of nanohole diameters and oxygen etching on electric field enhancements in cusp nanostructures

The effect of disc diameter in cusp structures and distance between two tips on the maximum electric field enhancements is studied using FDTD. Figure S4 (a) shows the maximum electric field enhancements for cusp nanostructure of various nanohole diameters with center-to-center gap of 90% (equivalent to short period of oxygen etching). It can be seen that cusp nanostructures of smaller diameter show large electric field enhancements at higher energy mode (~ 900 nm). In addition, as the center-to-center gap was decreased to 80% of disc diameter (equivalent to no oxygen etching) the magnitude of field enhancements for the same diameter also decreased as shown in Figure S4 (b).

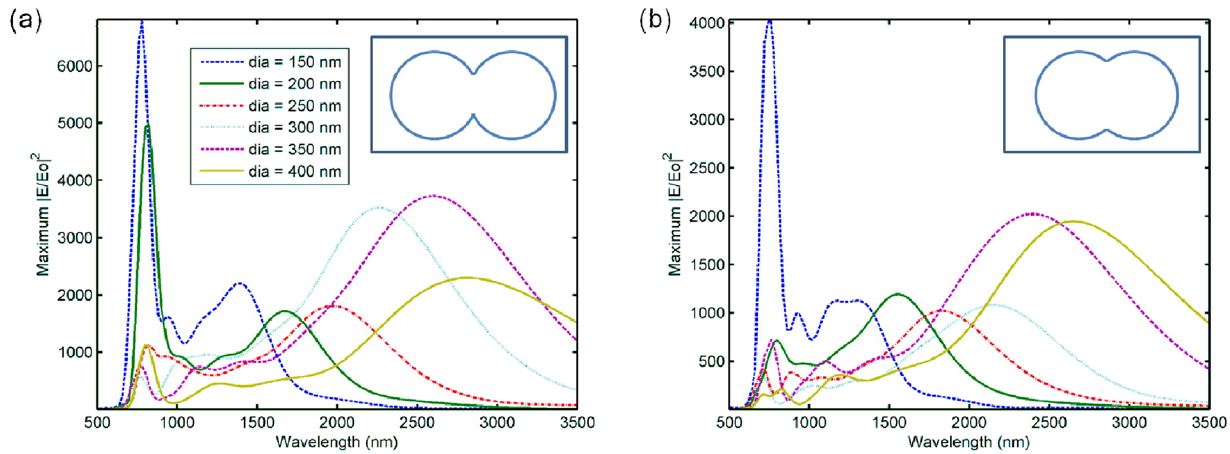

Figure S4. Maximum electric field enhancement *vs.* wavelength for cusp nanostructures of various nanohole diameters with nanohole center-to-center gap of a) 90% and b) 80% of nanhole diameter.