Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information: Electromagnetic Plasmonic Field of Nanoparticles Tune the Band Gap of Two-dimensional Semiconducting Materials

Chinedu Obiakara,[†] Mahmoud A. Mahmoud[†,±,‡*]

Chemical Engineering, Department of Biomedical Engineering,[†] Department of Chemistry,[±] Department of Physics and Astronomy, [‡] the University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249

[*]Mahmoud.abdelwahed@UTSA.edu

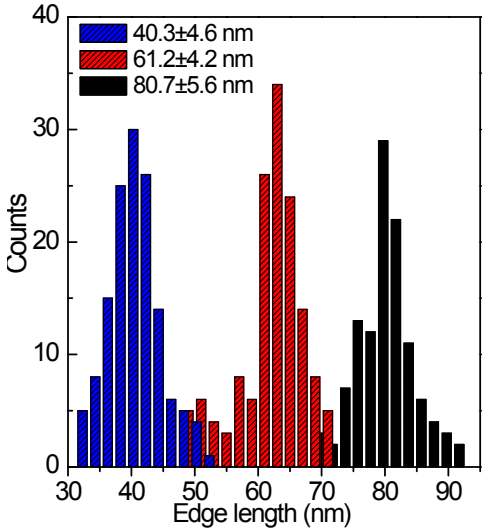

Figure S1 Statistical analysis of the edge length of Silver nanotetrahedron resulted from the overgrowth of silver hemispherical nanoparticles in a growth solution of: 2.5 mM citrate and 5 μM (blue), 5 mM citrate and 10 μM (red), and 7.5 mM citrate and 15 μM (black). ImageJ was used to determine the edge length of the AgNTs measured from AFM images for each batch.

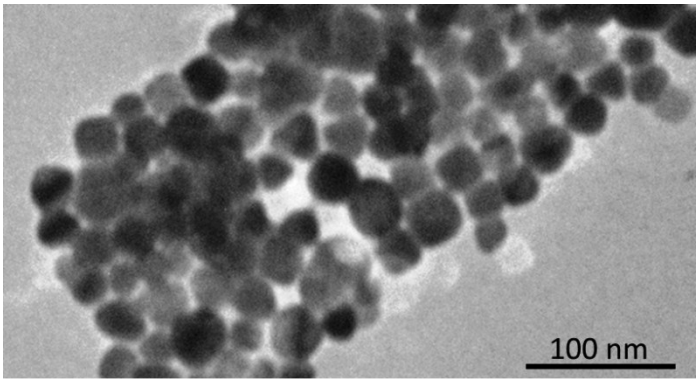

Figure S2 TEM image of round corners silver nanocubes resulted from the overgrowth of colloidal AgNDs in the presence of citrate ions at boiling temperature.

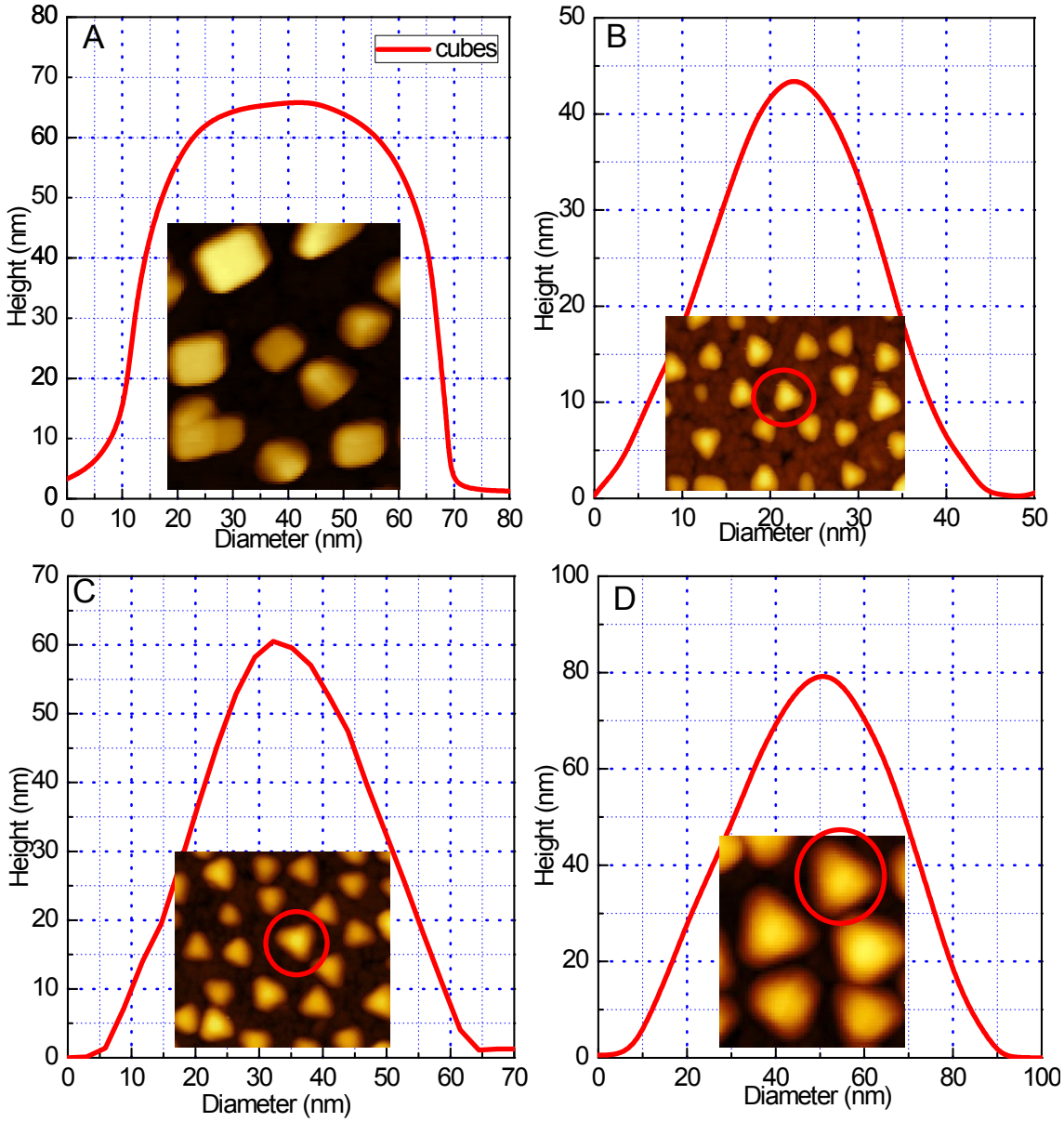

Figure S3 Topographical cross sections along the center of a silver nanoparticle highlighted by the circle: A) AgNC of wall length of 65.5±6.1 nm, B) AgNT of edge length of 40.3±4.6 nm, C) 61.2±4.2 nm AgNTs, and D) AgNT 80.7±5.6 nm in length.

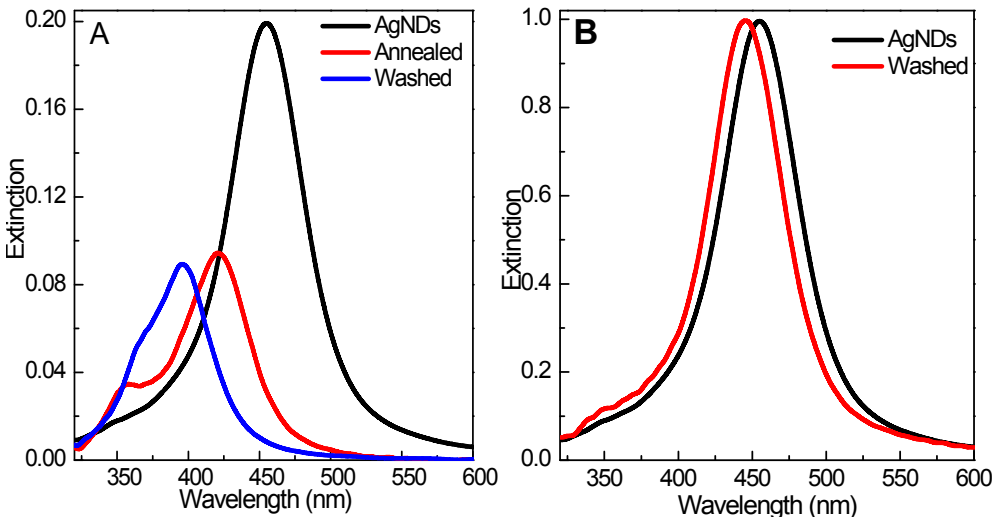

Figure S4 LSPR spectra of: A) AgNDs before annealing and after annealing into AgHSs and AgHSs after washing, B) AgNDs before and after washing.

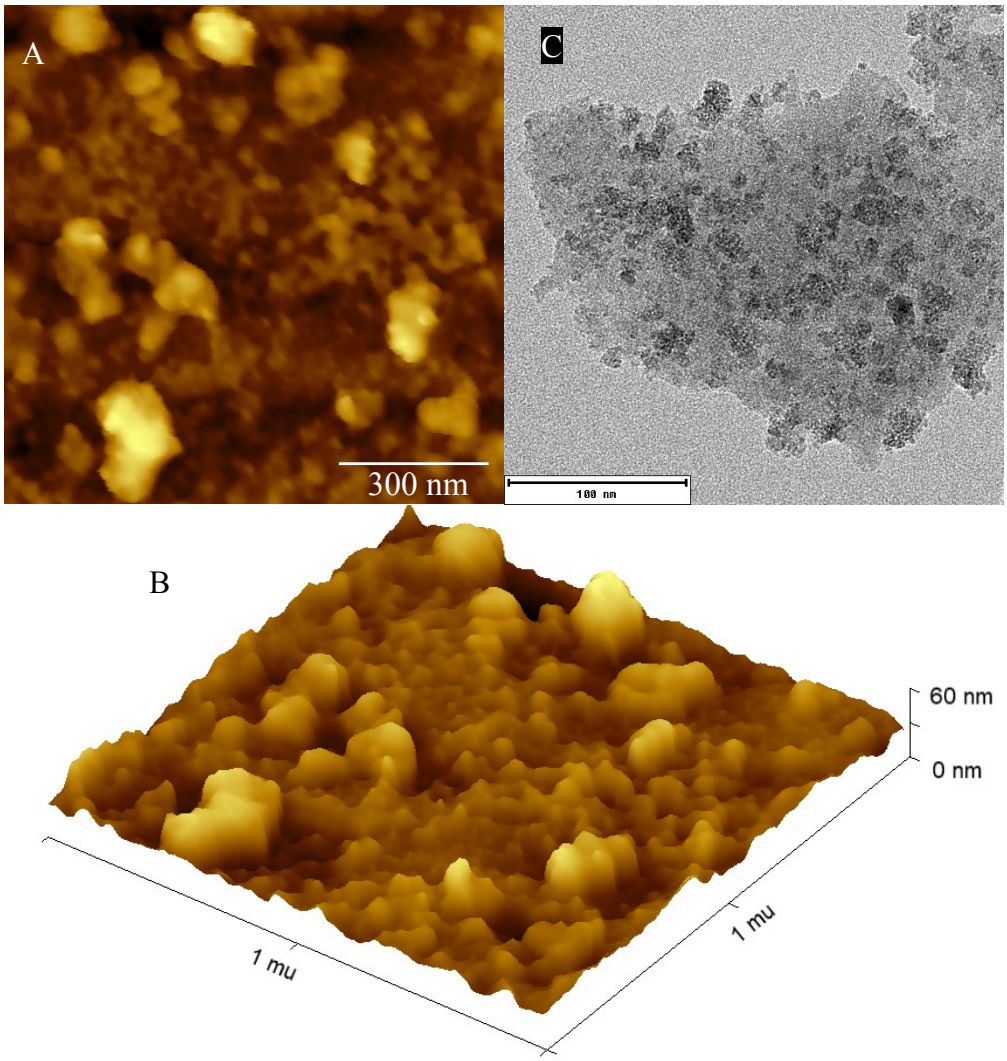

Figure S5 A and B) 2D- and 3D-AFM images of MoS_2 coated with PEG on top of 40 nm AgNT arrays. C) TEM image of MoS_2 coated with PEG, the polymer chains assembly is clearly seen on the surface of the MoS_2 sheet.

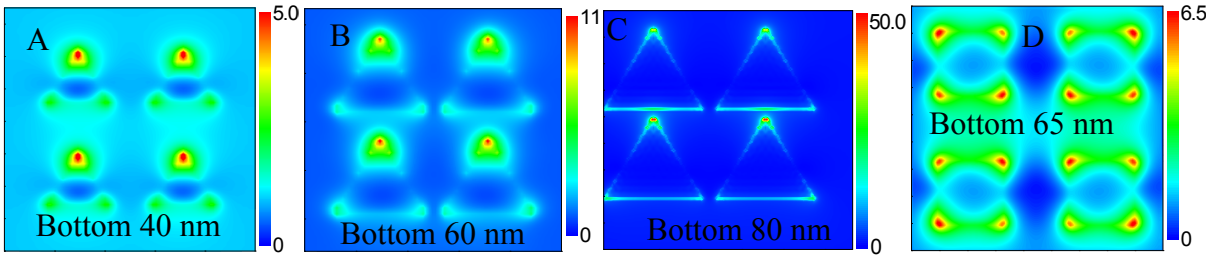

Figure S6 A-D is the plasmon field distribution close to the surface of a glass substrate of 40, 60, and 80 nm AgNT and 65 nm AgNC calculated by FDTD technique.

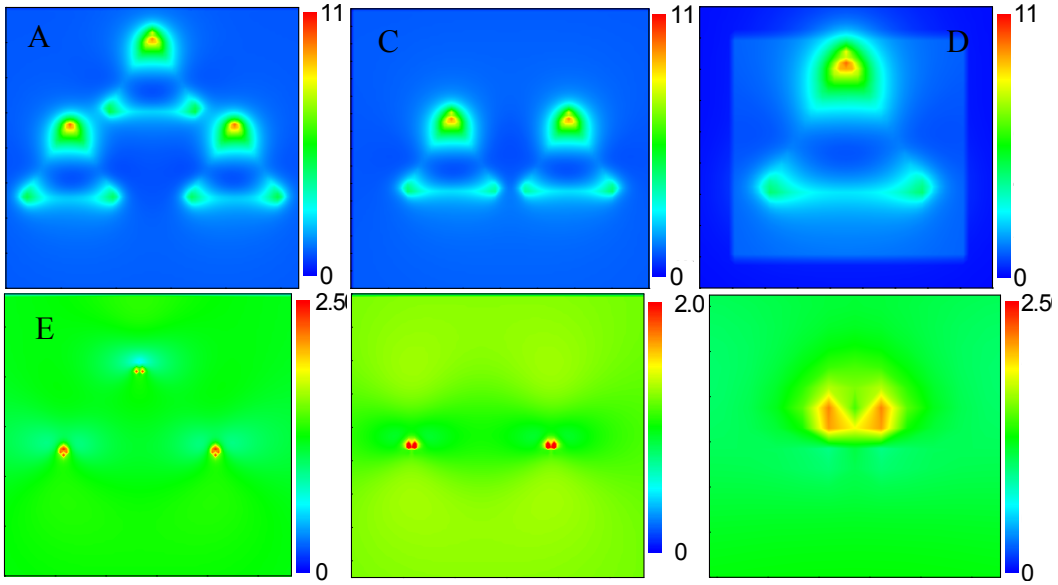

Figure S7 Plasmon field contour for 40 nm Silver nanotetrahedron on the surface of a glass substrate: A, B, C) single, dimer, and trimer near to the substrate, D,E,F) on the top of single, dimer, and trimer. The separation distance is 10 nm.

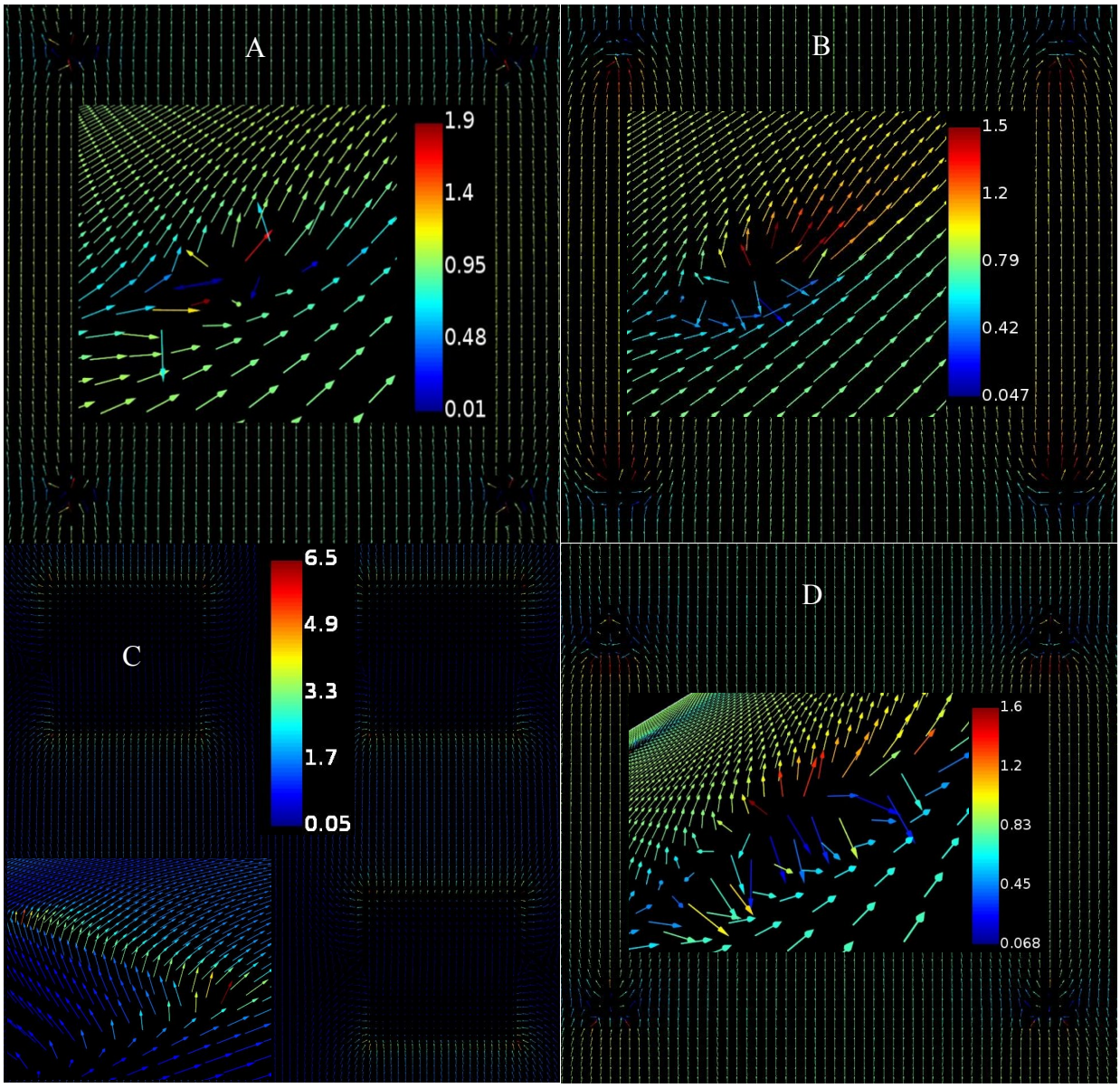

Figure S8 Electromagnetic vectors, calculated by FDTD technique, of four silver nanoparticle arrays on the surface of a glass substrate excited with linearly polarized light: b) 40 nm nanotetrahedron, c) 60 nm nanotetrahedron, d) 80 nm nanotetrahedron, and e) 65 nm nanocube. The highest field was observed for 60 nm nanotetrahedron. Using unpolarized light does not significantly change the directionality of the vectors.