

Supporting Information

Quantification of the Relative z-polarized
Electromagnetic Field Contribution and
Associated Investigation of Asymmetric Shape
of Layer Breathing Mode from Au
Nanoparticle-Graphene-Au Film Junctions

Won-Hwa Park

Material Characterization Team, Materials & Components R&D Lab, LG Electronics

Advanced Research Institute, 38, Baumoe-ro, Seocho-gu, Seoul, 137-724

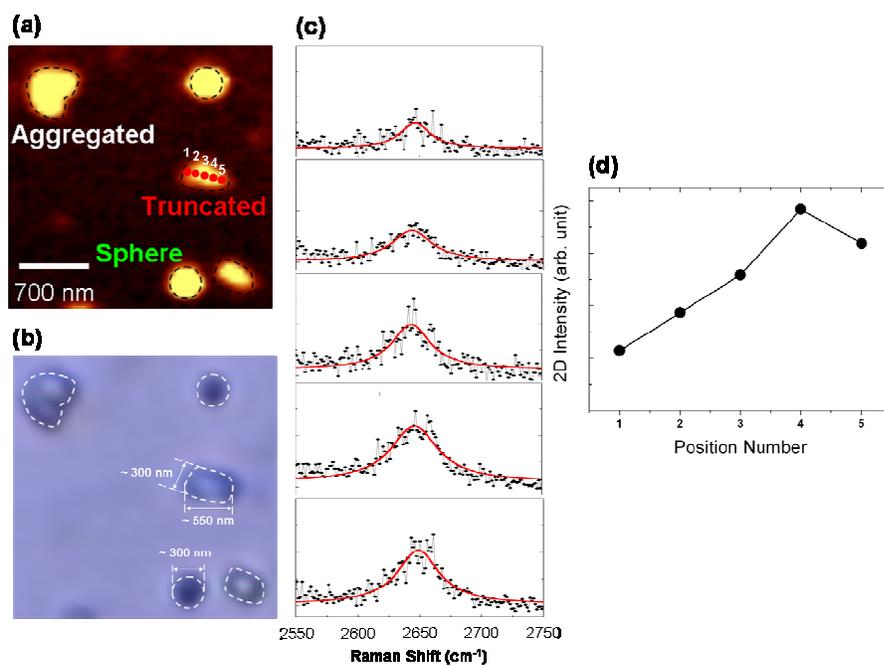


Figure S1. (a) Graphene SERS image gated at LBM and (b) the corresponded optical image. The numbers from #1 to #5 on the truncated Au NP are the points where the 2D peaks are acquired and analyzed. (c) and (d) show the corresponding 2D peaks from #1 to #5 and (d) displays the 2D intensity profiles from #1 to #5 on the truncated Au NP.

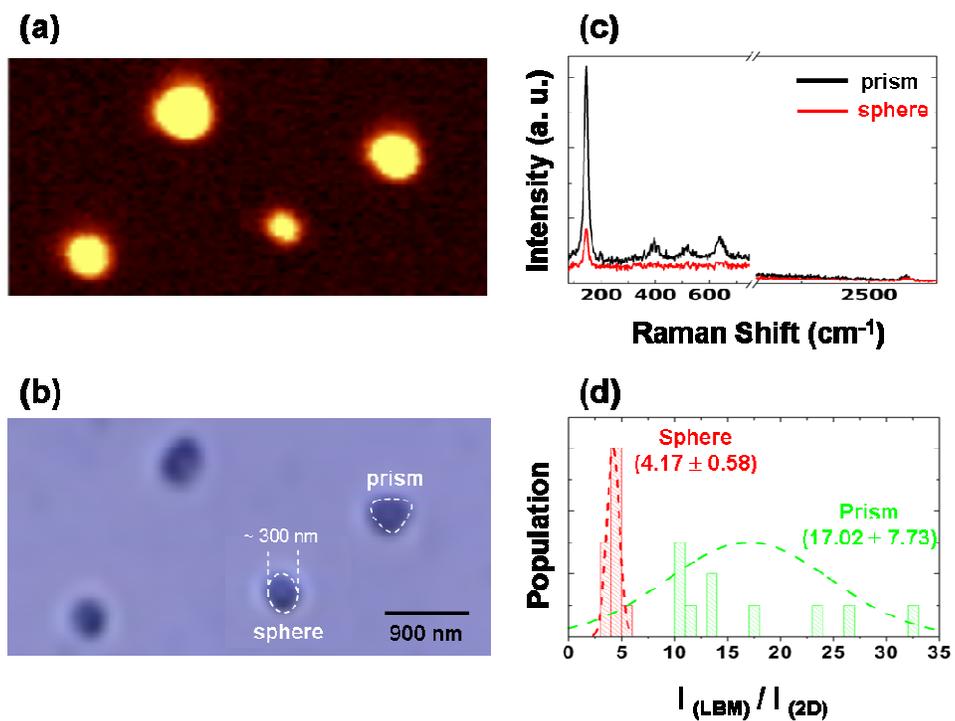


Figure S2. (a) Graphene SERS image gated at LBM and (b) the corresponded optical image. The sphere and prism shaped Au NPs are distinguished in (b). (c) shows the representative SERS spectra at Au prism-graphene-Au TF (black) and Au sphere-graphene-Au TF. (red) (d) exhibits that Au prism case shows stronger z-polarized EM field contribution via comparing the $I_{\text{LBM}}/I_{\text{2D}}$ values.

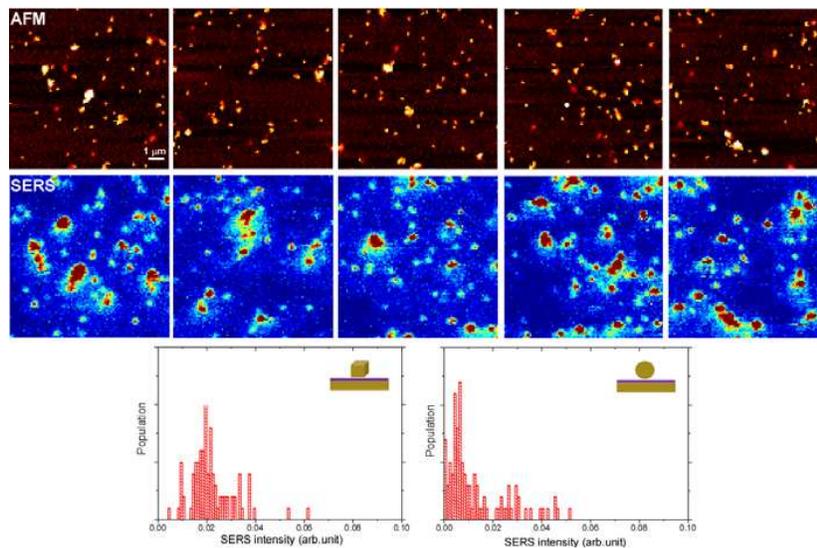


Figure S3. (up) Correlated AFM topography and SERS images of Au nanocube-Benzenethiol-Au thin film junctions. (bottom) Statistical distribution of Au nanoparticle shape dependence on SERS intensity between cube and sphere.

Reference in manuscript (complete author list)

(27) Li, X.; Cai, W.; An J.; Kim, S.; Nah, J.; Yang, D.; Piner, R.; Velamakanni, A.;

Jung, I.; Tutuc, E. Banerjee, S. K.; Colombo, L.; Rouff, R. S. Large-area synthesis of high-quality and uniform graphene films on copper foils. *Science*,

2009, 324, 1312-1314