Supporting Information

Graphene-Silver Hybrid Devices for Sensitive Photodetection in the Ultraviolet

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KEYWORDS: graphene, plasmonics, UV photodetector, Van Hove singularity, GLAD

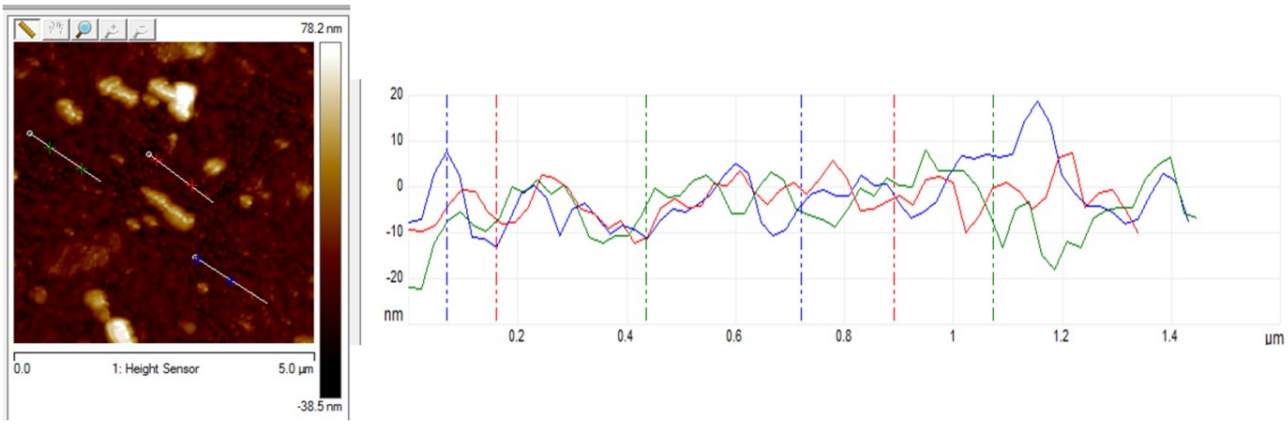

Figure S1: The left panel shows the AFM scan over a 5 µm by 5 µm on the device. The right panel shows the height profile along the three lines marked on the left panel. The variation in height profile is less than 10 nm indicating that the graphene hangs on the Ag nanoparticles.

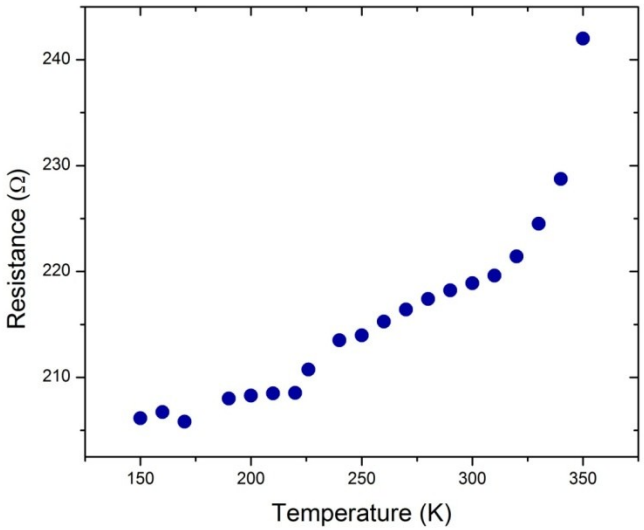

Figure S2: Resistance vs temperature measurement was done by placing the sample in vacuum in a low temperature probe station equipped with a thermal chuck. The chuck is cooled by continuous flow of LN_2. The temperature is controlled by a heater and a Lakeshore temperature controller. Sufficient time was allowed for the temperature to stabilize, following which we measured the two-probe IV response of the device (Agilent Device Analyzer B1500A).

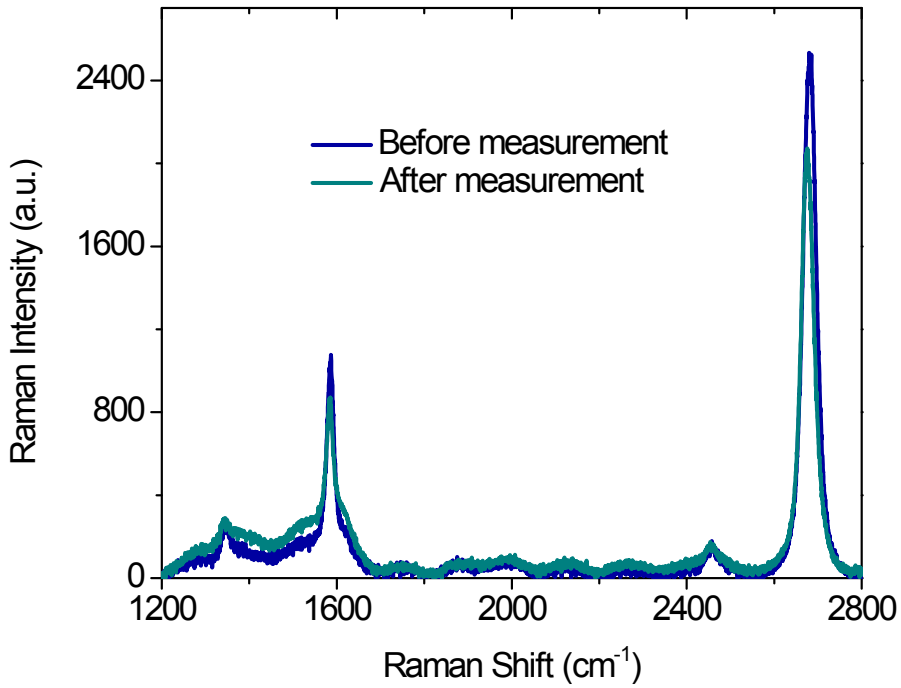

Figure S3: Raman spectra of graphene on Ag device before and after photoresponse measurements. This data clearly proves that there was no damage on our device after experiment.

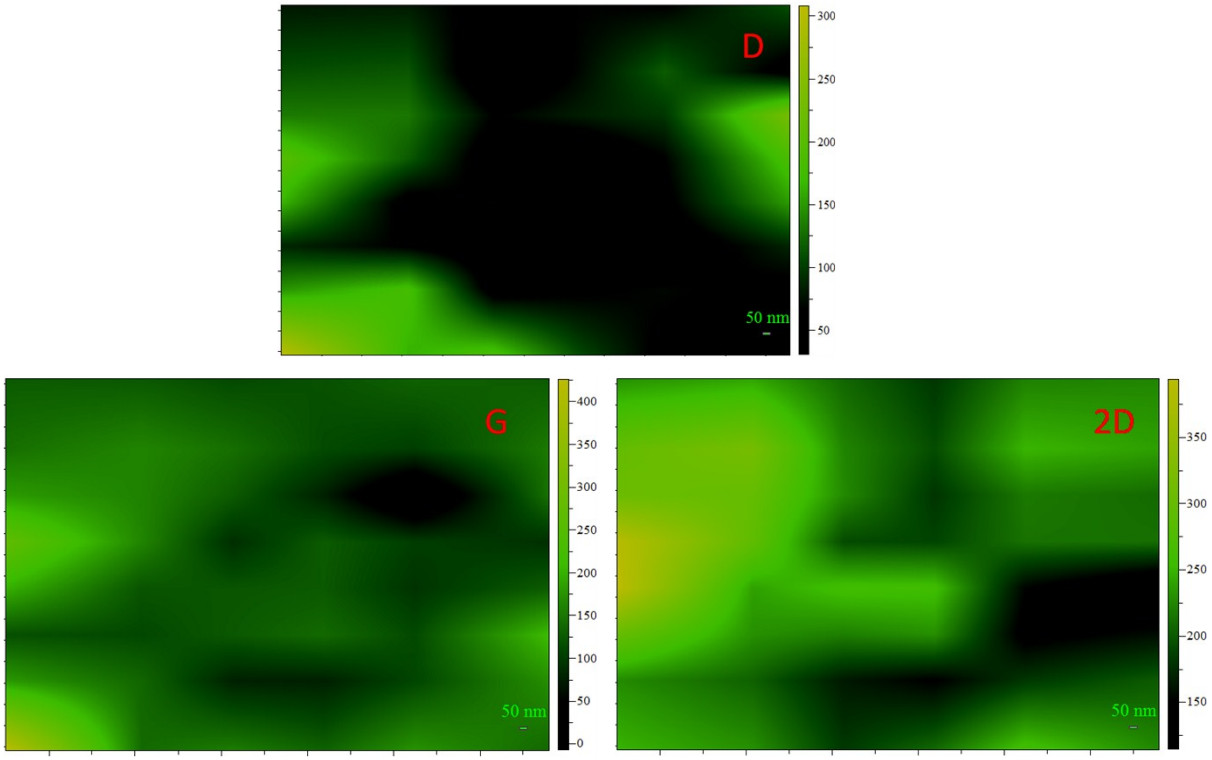

Figure S4: Raman map of D, G and 2D peaks (using a 532 nm laser) over 3.8 μm by 2.63 μm area for the graphene-Ag sample. There are about 20-30 nanoparticles present in the map area. The map for G and 2D peak looks more or less uniform over the entire area where as for the D peak the signal is prominent only in few places, which mostly indicate wear and tear in the CVD graphene.

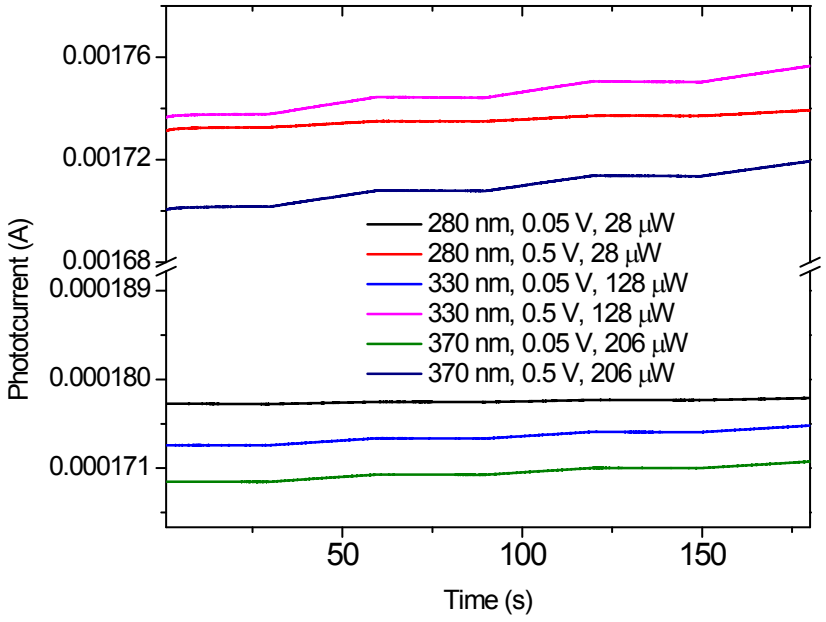

Figure S5: Measurement of photocurrent of graphene without any silver nanoparticles (control sample) with similar channel dimensions as that of graphene+Ag device. 30 seconds light on-off experiments at different wavelengths and bias voltages do not show any measurable photoresponse. A small amount of light activated drift in graphene is observed, which usually disappears on pumping the vacuum chamber overnight.

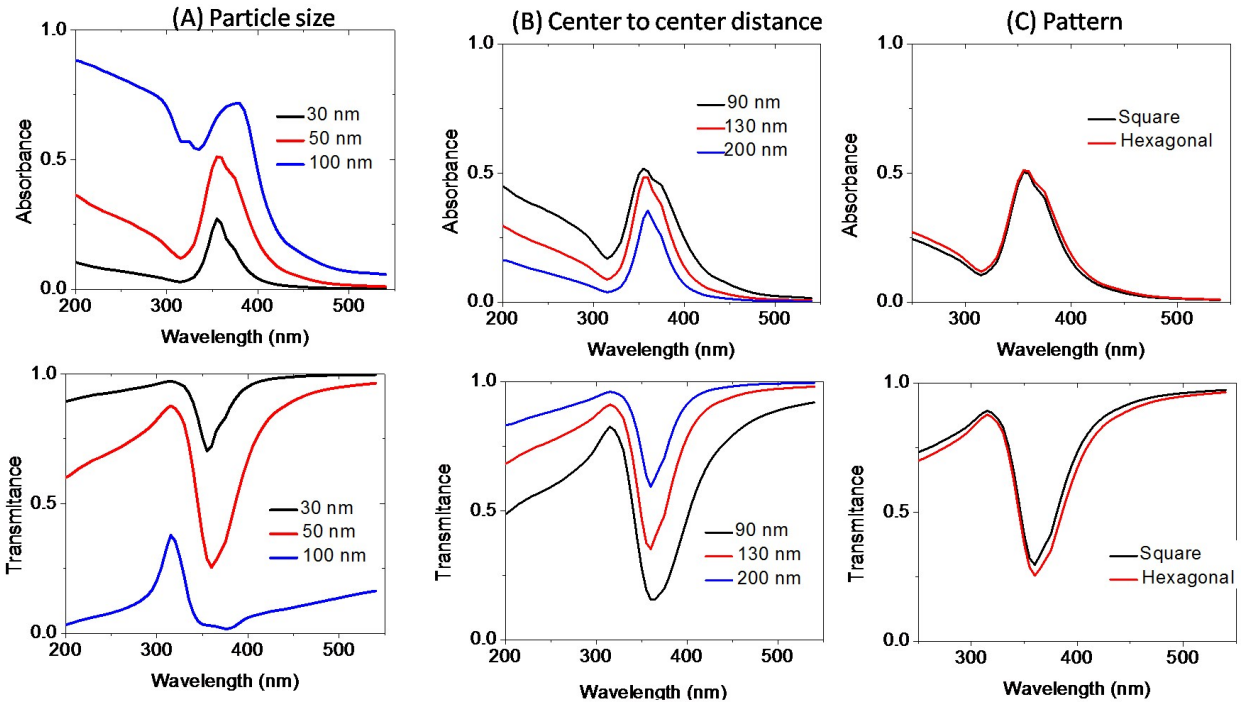

Figure S6: Simulations to show dependence of LSPR peak of the infinite array of Ag nanoparticle on (A) particle size (keeping the centre to centre distance fixed at 110 nm), (B) center to center distance (keeping the particle size fixed at 50 nm) and (C) pattern (keeping the particle size fixed at 50 nm and centre to centre distance at 110 nm). Maximum tunability can be achieved by changing the nanoparticle size as is evident from the figure. Distance between the nanoparticles considered here is too large to give rise to any strong coupling between the nanoparticles.