Electronic Supplementary Material (ESI) for Nanoscale

Supplementary Information for "Tunable SERS using Gold Nanoaggregates on an Elastomeric Substrate"

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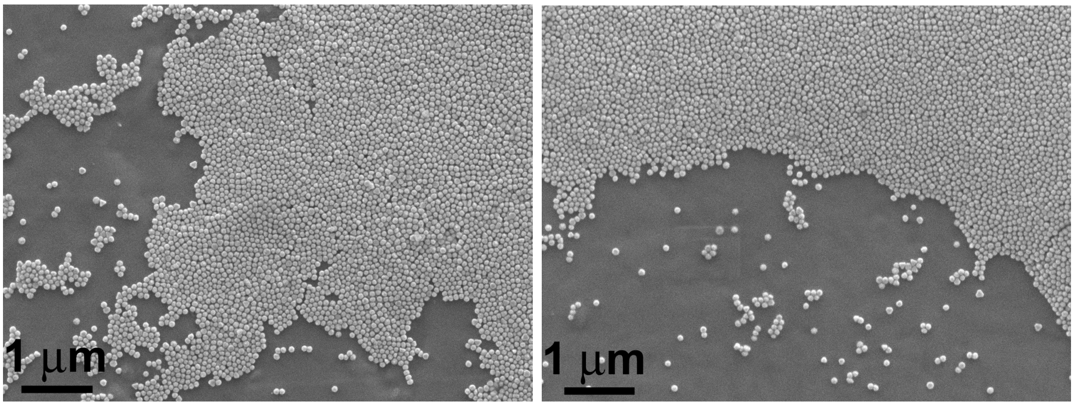


(a) (b)

FIG. 1: Further SEM imaging (JEOL JSM-6500F SEM, accelerating voltage 3 kV) of gold nanoparticles deposited on an thermoplastic polyurethane substrate, using the deposition method described in the main text.

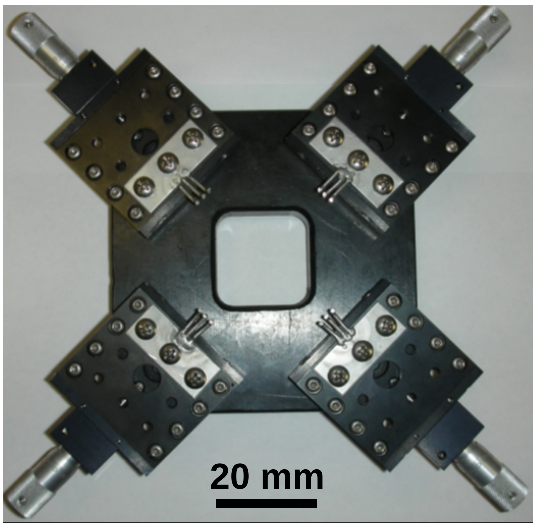
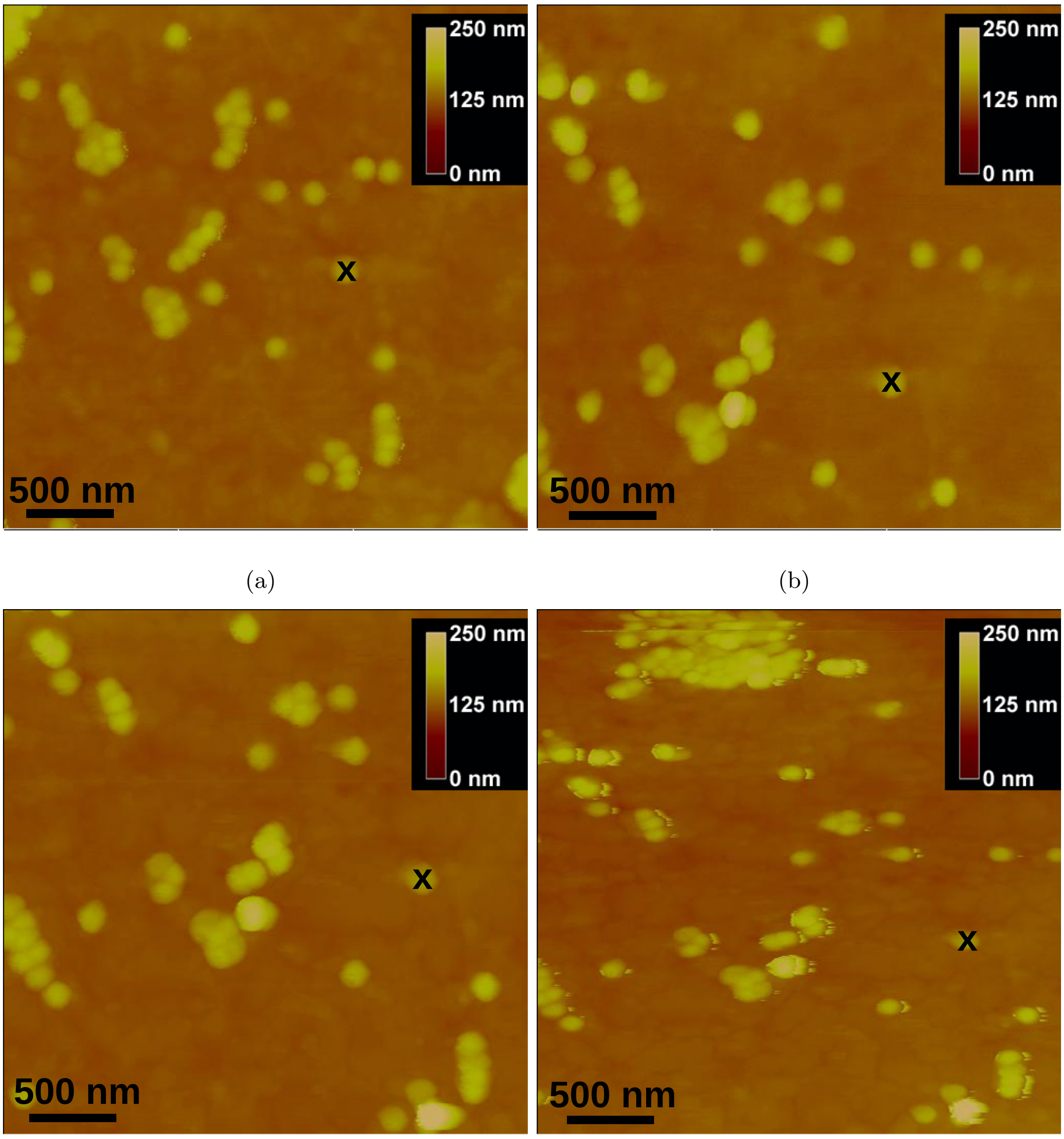
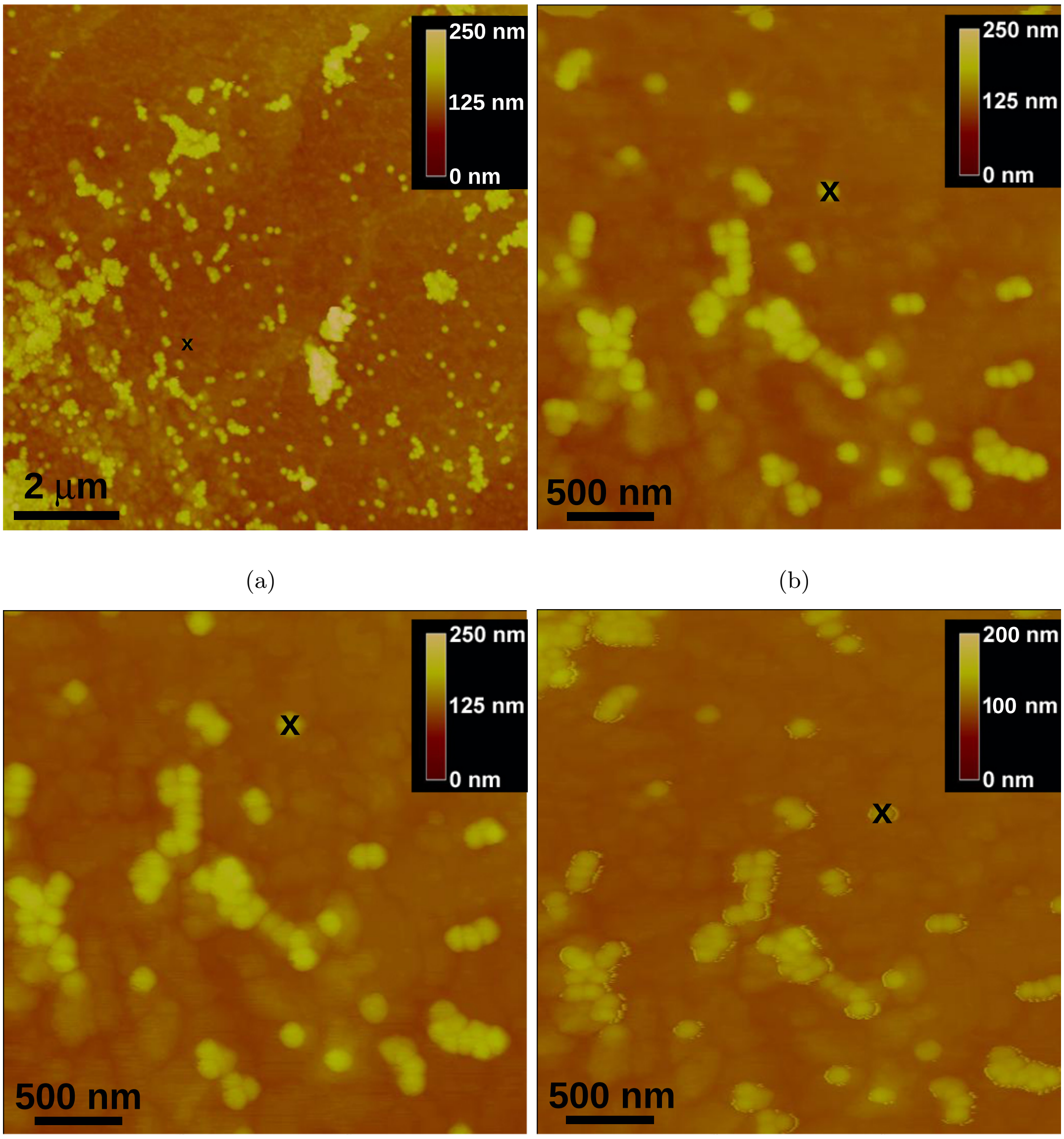


FIG. 2: The customised stage used for controlled application of macroscopic strain to the elastomeric specimens, including during AFM and SERS measurements. Each micrometer stage was fitted with teeth which fitted into the holes on the legs of the specimens.



(a) (b) (c) (d)

FIG. 3: AFM images showing a specific region of gold nanoparticles deposited on a thermoplastic polyurethane membrane, obtained using a Digital Instruments Dimension 3100 atomic force microscope in tapping mode. These images were used to collect 'Set 1' data in Fig. 2(b) of the main text. The applied stretches in (a)-(d) were $\alpha = 0$, 0.17, 0.36 and 0.48 respectively. The nanoparticle indicated by an "x" is the same in each image.



(a) (b) (c) (d)

FIG. 4: AFM images for a further specific region of gold nanoparticles deposited on a thermoplastic polyurethane membrane (distinct from Fig. 3). These images were used to collect 'Set 2' data in Fig. 2(b) of the main text. The applied stretches in (a)-(d) were $\alpha = 0$, 0.17, 0.36 and 0.48 respectively. The nanoparticle indicated by an "x" is the same in each image.

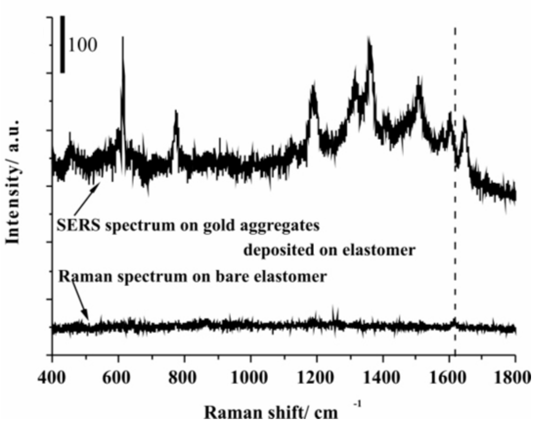
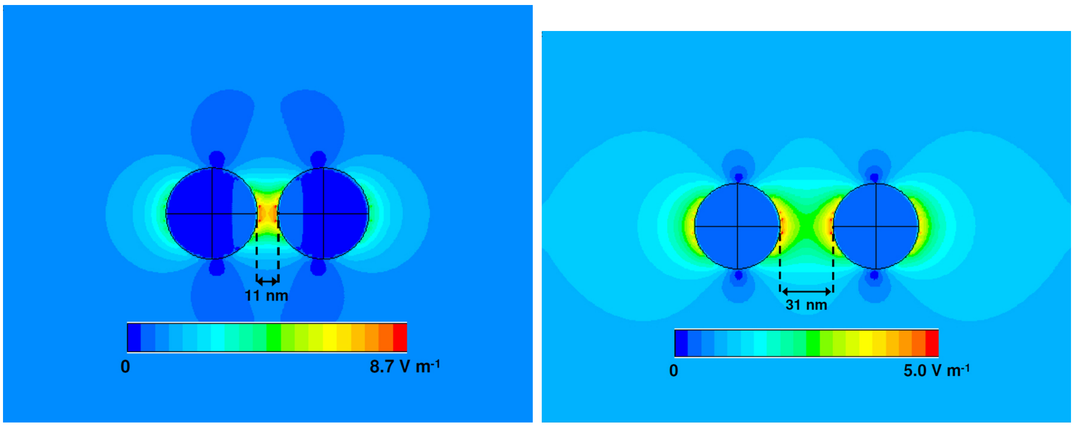


FIG. 5: Far field SERS signals obtained on a static membrane using a triple spectrometer (T64000, Jobin-Yvon) with 647 nm lines from a Kr+ laser. Signals were collected with 60 s exposure time and ∼100 μW laser power at the sample surface. The signal for R6G (e.g. at 610 cm^{-1}) was enhanced in the presence of gold aggregates, whereas the most prominent feature for the bare elastomer is near 1610 cm^{-1}, indicated by the vertical dotted line.



(a) (b)

FIG. 6: Near electric field distributions (S-polarization for 633 nm excitation) for a dimer of 50 nm gold spheres, calculated using Plank finite difference time domain software. Dimer separation g is (a) 11 nm and (b) 31 nm, representing the extreme simulated values.