Electronic Supplementary Material (ESI) for Analyst.

Supporting Information

Utilizing Molecular Resonance-Localized Surface Plasmon Resonance Coupling For Copper Ion Detection In Plasma

ReJeana Cary, Sarah Unser, Ilaina Monroe, Joseph Holbrook, and Laura Sagle*

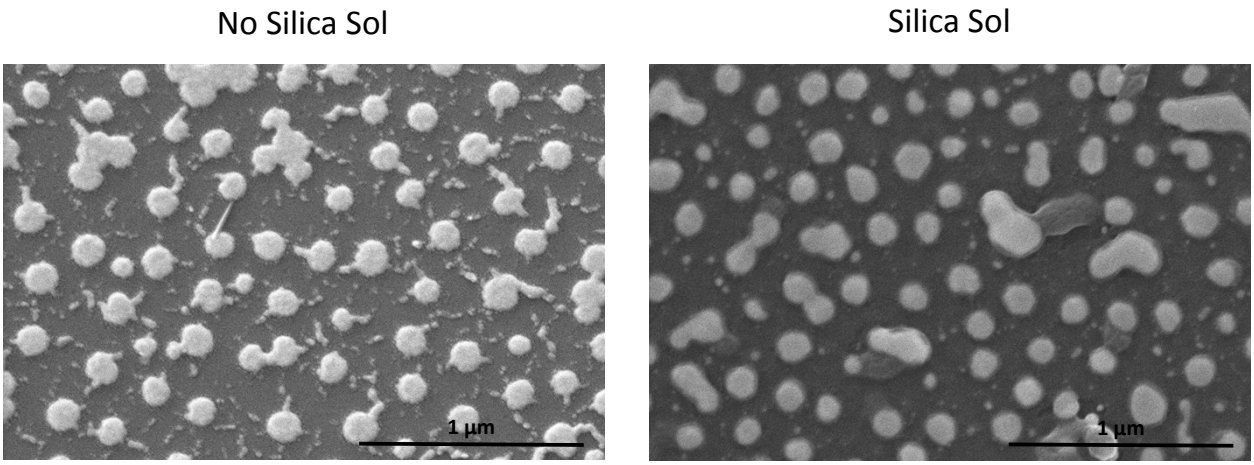

Figure S1. SEM images of glass substrates containing gold nanoparticles (120 nm x 40 nm) without 0.25% silica sol, left, and with 0.25% silica sol, right. Since the height and shape of the nanoparticles appears similar in both images, the coating of the silica sol in the right image appears to be a conformal, uniform coating.

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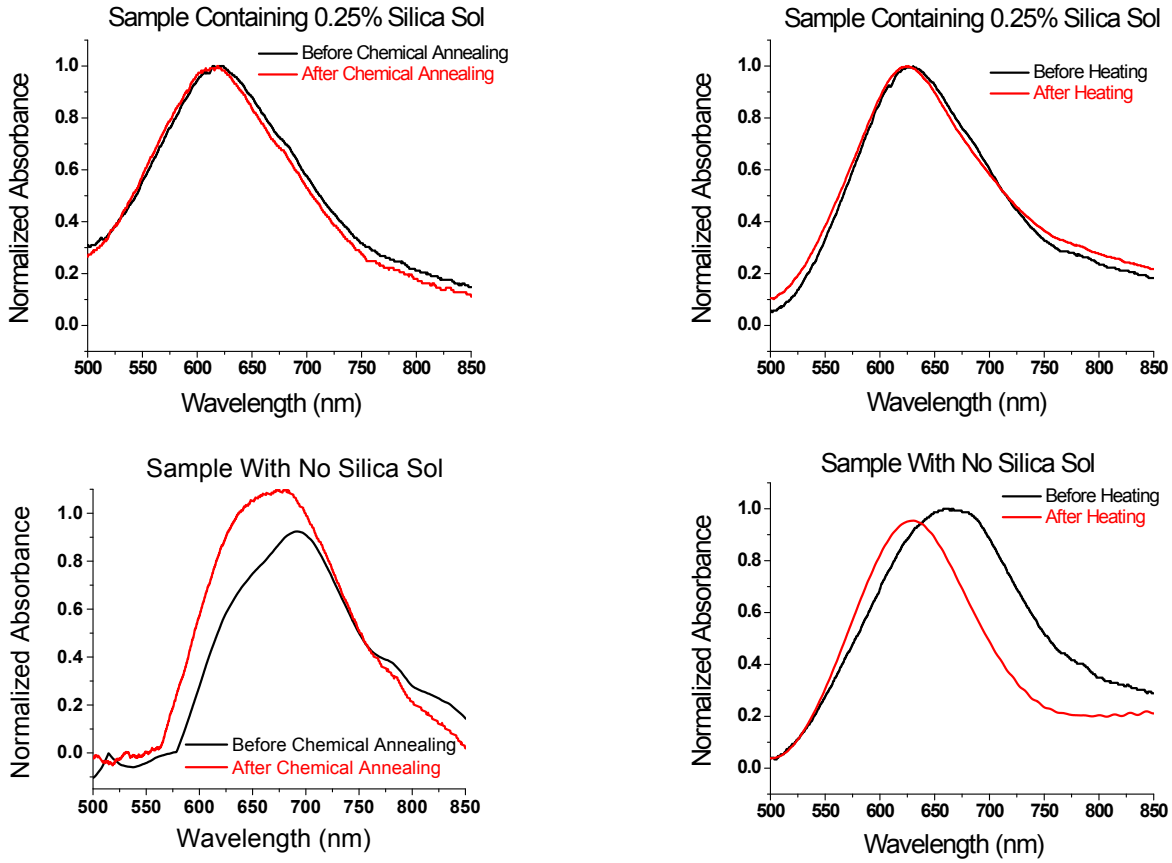

chemical annealing with sol	
	-2.96526
	-0.99976
	-4.37338
	-4.81925
	-0.50222
average	-2.33
std	2.50

heat annealing with sol	
	-5.00819
	-4.78011
	-4.25611
	-3.43004
	-2.45458
	-2.27384
average	-3.69
std	1.17

chemical annealing no sol	
	-8.66675
	-15.90257
	-19.66011
	-9.09672
	-8.96944
average	-12.45
std	5.04

heat annealing no sol	
	-13.1594
	-32.2471
	-7.56491
	-4.46273
	-10.8483
	-16.3008
average	-16.62
std	9.60

Figure S2. Comparing the stability of the nanoparticle arrays with sol versus no sol. For the spectra shown to the left (top and bottom), UV-Vis spectra were taken both before and after treating the nanoparticle arrays with the copper sulfate/sodium ascorbate aqueous solution for 1 hour. The spectra shown on the top left is with silica sol and the one beneath it without silica sol. For the spectra shown to the right (top and bottom), UV-Vis spectra were taken both before and after heating the samples at 300 °C for 1 hour. The spectra shown on the top right is with silica sol and the one beneath it without silica sol. The tables below the representative raw spectra show statistics of all measurements made on

these samples. Overall, for both chemical and heat-treated samples, the ones containing silica sol showed smaller shifts in the LSPR peak maximum and appears to be less susceptible to annealing.

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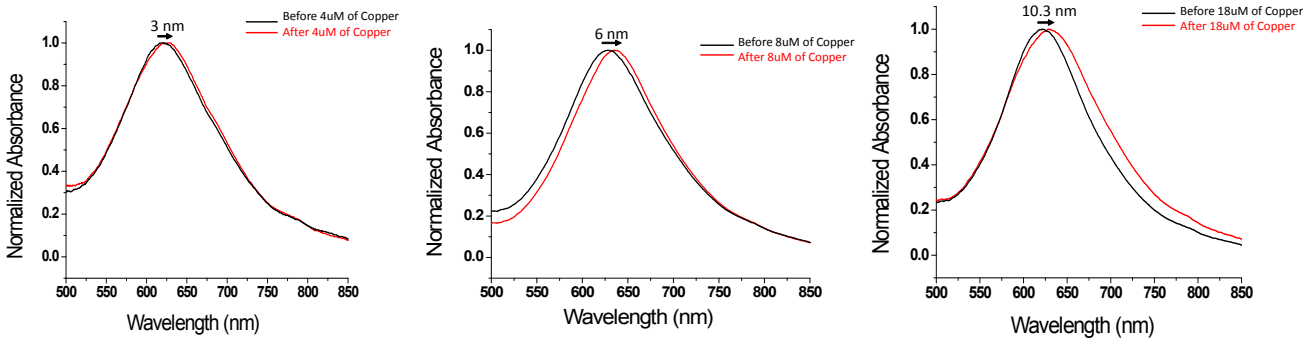

Figure S3. Representative spectra of the LSPR shifts induced upon addition of different concentrations of copper to the functionalized nanoparticle arrays. Such data was used to construct the calibration curve shown in Figure 2. Left is spectra before and after the addition of 4 µM of copper and shows a 3 nm red shift. Middle is spectra before and after the addition of 8 µM of copper and shows a 6 nm red shift. Right is spectra before and after the addition of 18 µM of copper and shows a 10.3 nm red shift.