Supporting Information

Investigating the Stability of Gold Nanorods Modified with Thiol Molecules for Biosensing

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For the preparation of PSA and Glypican-3(GPC3) functionalized GNRs, 0.1 mL of 20 mM DSNB solution were added to 5 mL of the 1st GNRs solution with continuous stirring for 60 min. 0.02 mL of 10mM PEG (MW~5000) solution was then added to the above solution and stirred for another 30min. To remove extra DSNB as well as PEG (the added amount of PSA and GPC3 antibody is limited, and not as much as that of BSA used in this work, which is ~5 μM), the solution is then centrifuged and resuspended in 2.5 mL water before immobilizing antibody. As discussed, this procedure could compromise the stability of GNRs, which accounts for the fact that PEG is introduced to help stabilize GNRs at low CTAB concentration.

PSA or GPC3 antibody was then added to the DSNB/PEG-GNRs solution for immobilization. Afterwards, certain amount of antigen (20 nM) was added. The solution was characterized by UV-Vis spectrometer at each step, as shown in Table S1. The DSNB/PEG modification yielded a consistent red shift of around 6-7 nm, antibody attachment resulted in a red-shift of around 4-6 nm, and the addition of antigen leaded to another 5-6 nm red-shift. Here the red-shift observed after introducing antigen was not observed when the antigen does not match the antibody (for example, GPC3 antibody added to PSA antibody modified GNRs), indicating that the antigen can only interact with specific antibody modified GNRs, which is of great importance for bio-sensing.

Peak Wavelength(nm)	GPC3	PSA	
1st GNRs	770	773	818
GNRs-DSNB/PEG (Before centrifuge)	777	780	824
GNRs-DSNB/PEG (After centrifuge)	773	779	821
GNRs-DSNB/PEG-antibody	779	784	825
GNRs-DSNB/PEG-antigen	784	790	830
DSNB/PEG induced red shift	7	7	6
Antibody induced red shift	6	5	4
Antigen induced red shift	5	6	5

Table S1. Peak wavelength of 1st / modified GNRs and the red shift induced by modifications.