Supporting Information

Effects of Small Molecules on DNA Adsorption by Gold Nanoparticles and a Case Study of Tris(2-carboxyethyl)phosphine (TCEP)

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Figure S1. Photographs of GSH, TCEP and SPDP-capped AuNPs after different treatments. i): with 10 mM added molecule; ii): with 20 mM NaOH addition to the samples in i) for 30 min. The aggregated AuNPs can re-disperse after adding NaOH, suggesting that the AuNPs aggregated due to lowered pH by the added molecules.

Figure S2. UV-vis spectra of (A) citrate-capped AuNPs, (B) BSPP-AuNPs, (C) SCN⁻-AuNPs, (D) GSH-AuNPs, (E) GMBS-AuNPs, (F) Br⁻-AuNPs and TCEP-AuNPs. The original samples were without any NaCl addition (black spectra). 200 mM NaCl was then added to each and all the samples changed color to blue as shown in the main paper. After centrifugation and re-dispersion, the UV-vis absorption spectra of the treated samples were recorded (red spectra). Only the BSPP-capped AuNPs (in panel B) fully recovered the red color and didn’t show any shift compared with original one. The final AuNP concentration was 2 nM for this experiment.
Figure S3. Displacement of pre-adsorbed FAM-labeled FAM-9A5-SH DNA by freshly prepared TCEP and TCEP stored in 5 mM PB buffer, pH 7.4 for 12 h. The stored TCEP was intended for oxidation. The displacement reaction was performed in HEPES buffer, pH 7.4 overnight. The oxidized TCEP had a weaker ability to displace the adsorbed DNA.
Figure S4. Photographs of the co-adsorption AuNP samples. The concentration of each of the added molecule was 1.7 mM, and the concentration of FAM-DNA-SH was 3 µM.

Figure S5. Displacement of pre-adsorbed FAM-labeled 15-mer DNA by freshly prepared TCEP in HEPES buffer, pH 7.4 overnight.

Figure S6. Adsorption of FAM-labeled non-thiolated DNA (A15, T15 or C15) onto citrate-capped AuNPs in 10 mM HEPES buffer for 12 h without or with 1 mM TCEP.
Figure S7. (A) Adsorption capacity of A5 DNA onto citrate-capped AuNPs in the presence of different concentrations of TCEP. (B) pH change at different TCEP concentrations in 10 mM HEPES buffer (pH 7.4). At high TCEP concentrations, the HEPES buffer lost its buffering ability. (C) Adsorption capacity of A5 DNA onto citrate-capped AuNPs in 10 mM HEPES buffer of different pH.