

Supplemental Information

Gastrointestinal Bioavailability of 2.0 nm Diameter Gold Nanoparticles

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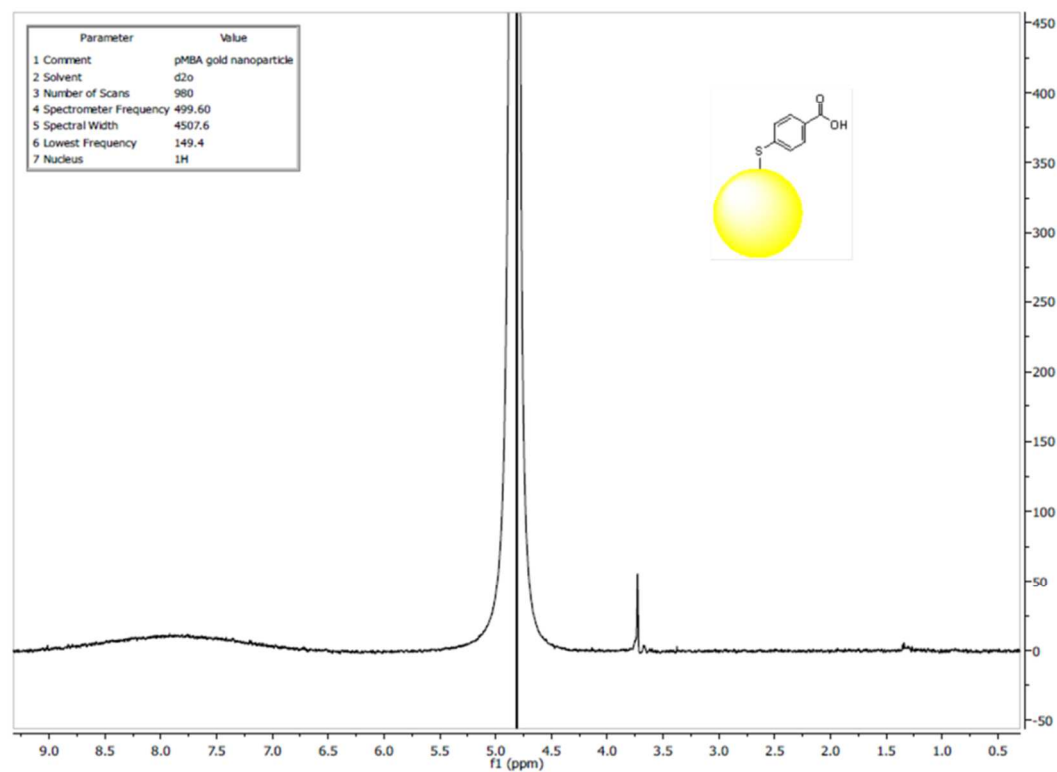
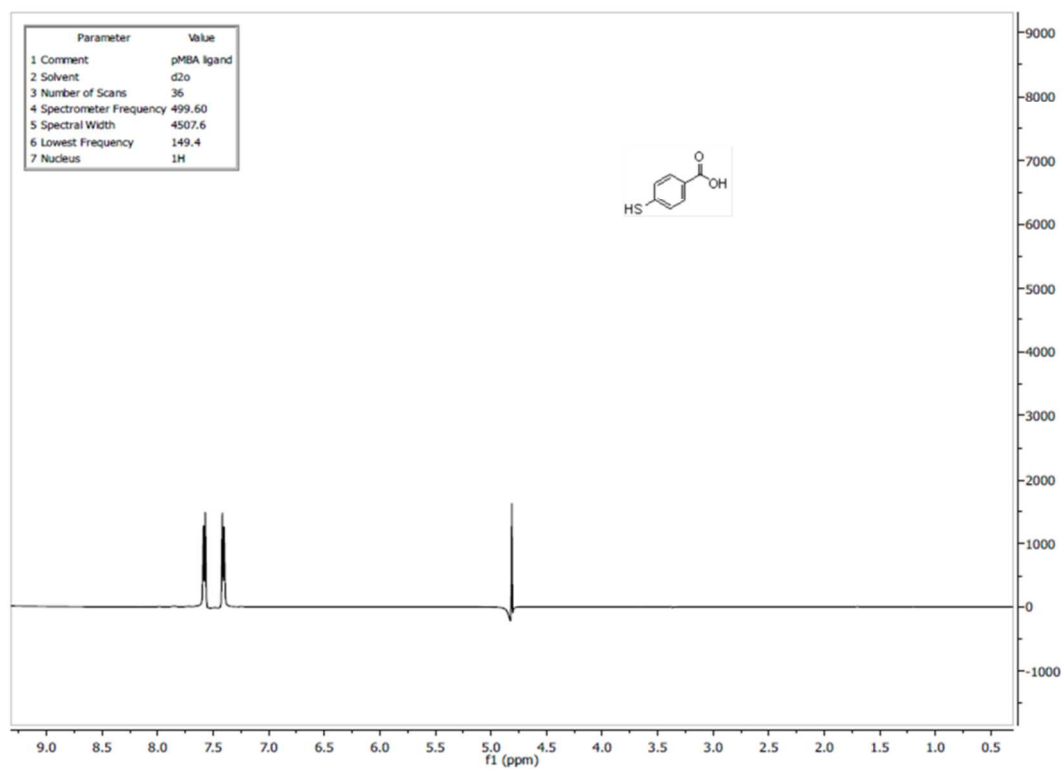


Figure S1. ^1H NMR spectra in $\text{D}_2\text{O}/\text{H}_2\text{O}$ for the *para*-mercaptobenzoic acid (pMBA) (top) and pMBA-coated gold nanoparticles (bottom).

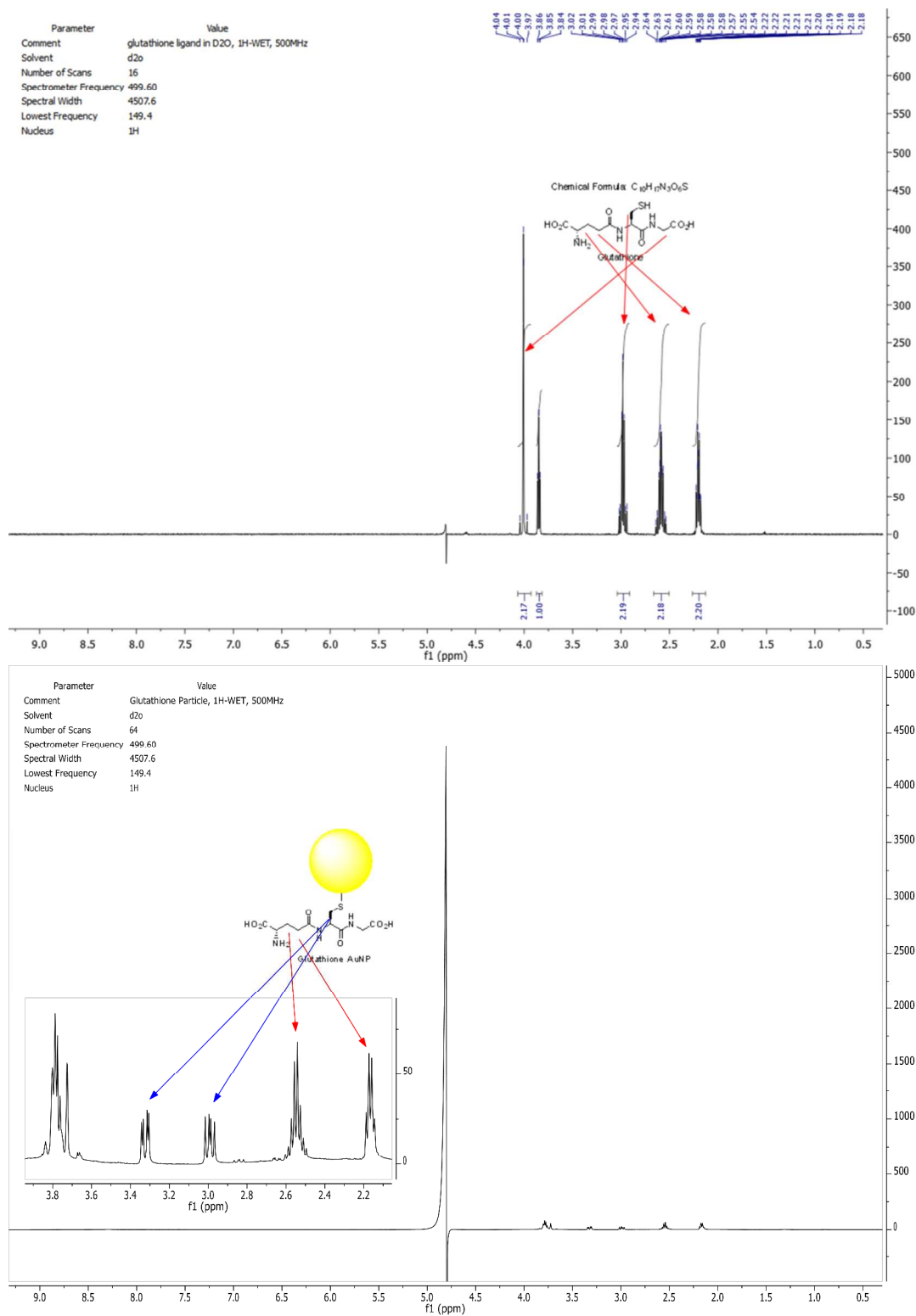
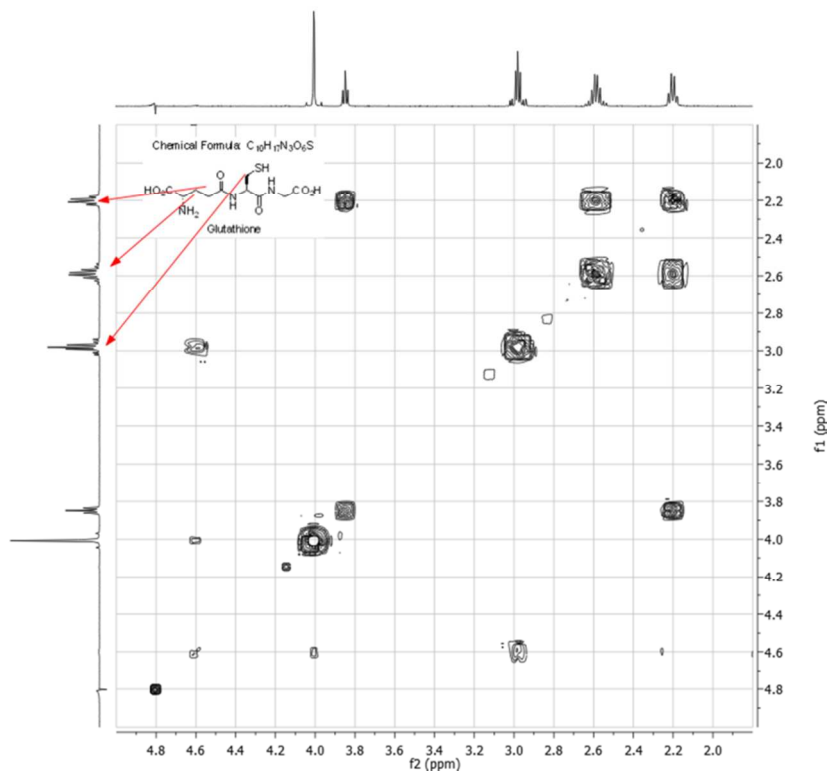


Figure S2. NMR spectra in D₂O/H₂O for glutathione ligand (top) and glutathione-coated gold nanoparticles (bottom)

Parameter	Value (f2, f1)
Comment	Glutathione ligand, WET-gCOSY, 500MHz
Solvent	d2o
Number of Scans	2
Spectrometer Frequency	(499.60, 499.60)
Spectral Width	(4507.6, 4507.6)
Lowest Frequency	(149.4, 149.4)
Nucleus	(1H, 1H)



Parameter	Value (f2, f1)
Comment	Glutathione Particle, WET-gCOSY, 500MHz
Solvent	d2o
Number of Scans	2
Spectrometer Frequency	(499.60, 499.60)
Spectral Width	(4507.6, 4507.6)
Lowest Frequency	(149.4, 149.4)
Nucleus	(1H, 1H)

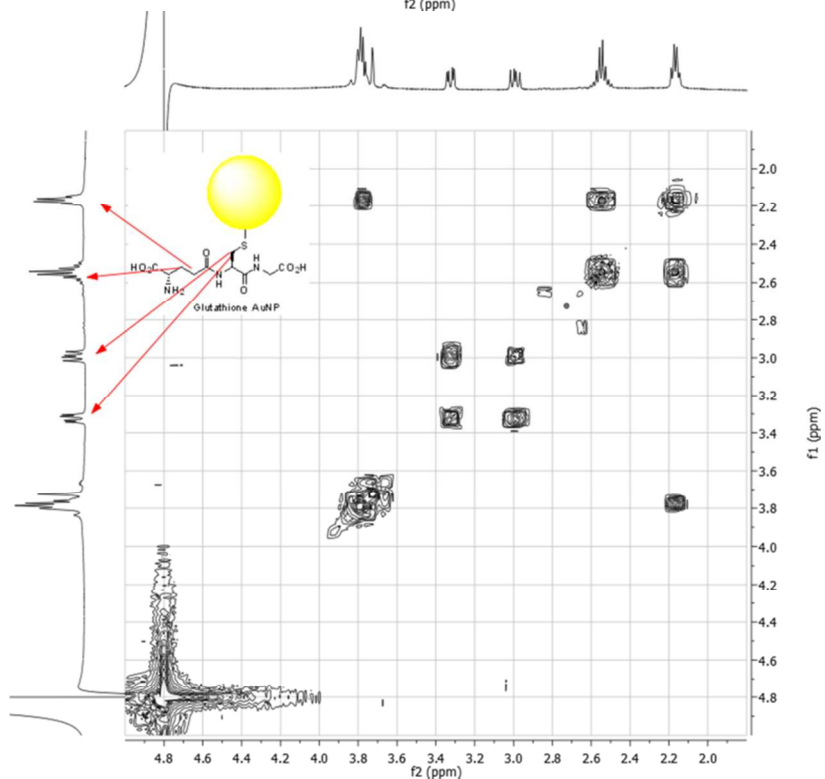


Figure S3. Gradient COSY 1H NMR spectra in D₂O/H₂O for the glutathione (GSH) ligand and gold nanoparticles. Spectra are as follows GSH ligand (top) and GSH gold nanoparticles (bottom).

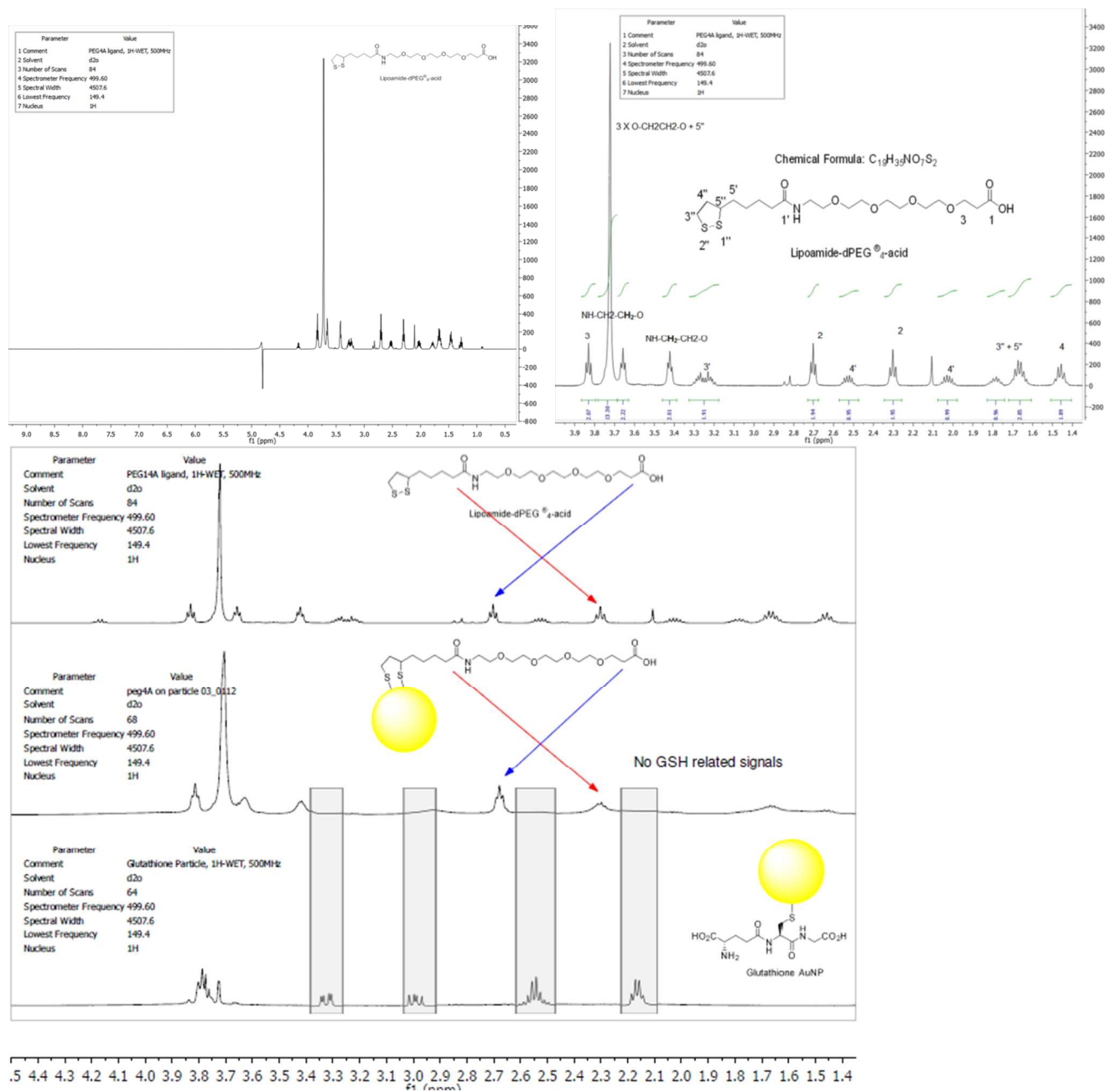


Figure S4. ¹H NMR spectra of PEG4A ligand (top left), PEG4A ligand with integrations (top right), and stackplot of PEG4A ligand/PEG4A Au NP/ GSH Au NP (bottom).

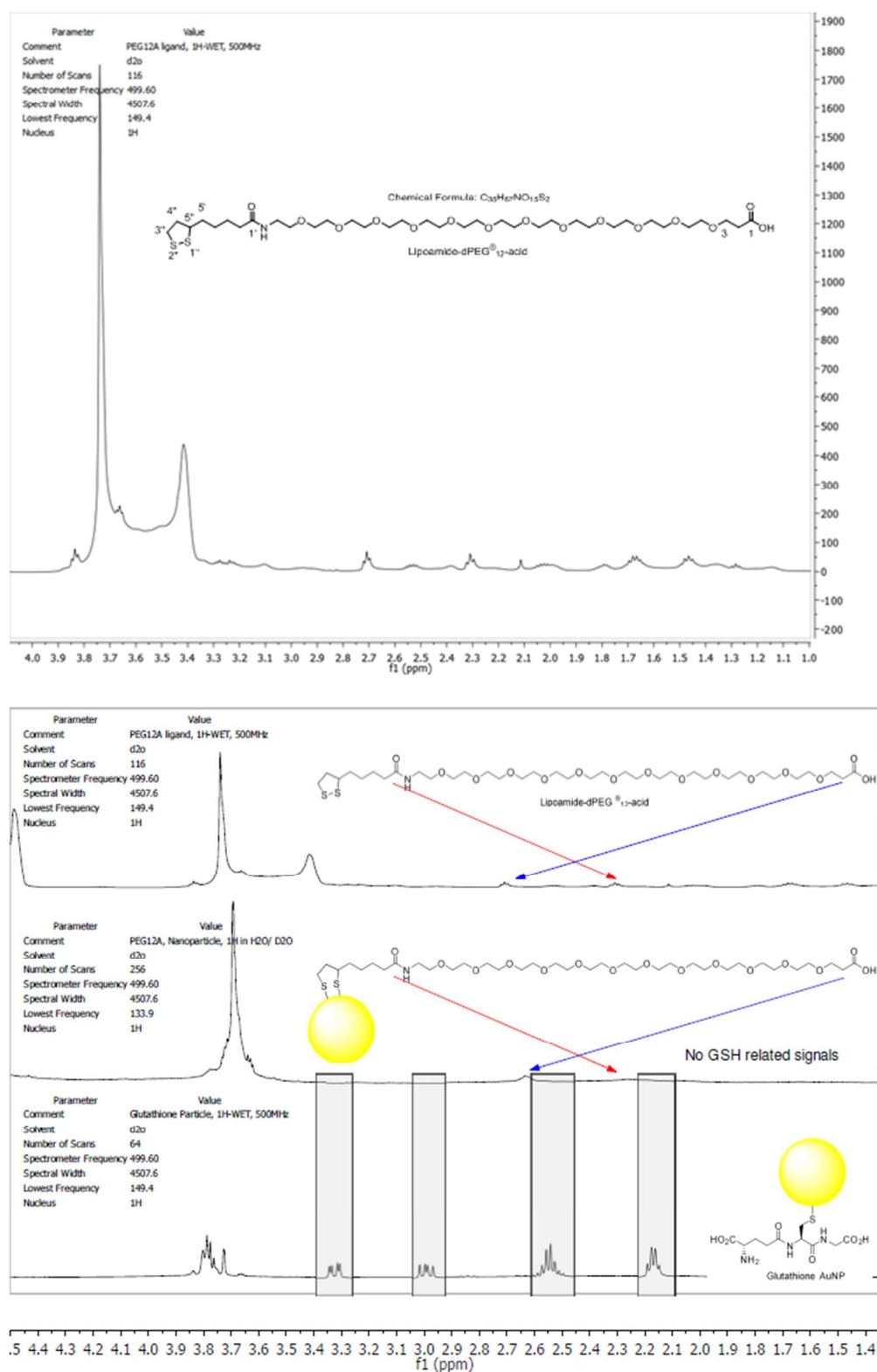


Figure S5. ¹H NMR spectra in D₂O/H₂O of PEG12A ligand (top left) and a stackplot of PEG12A ligand/PEG12A Au NP/GSH Au NP (bottom).

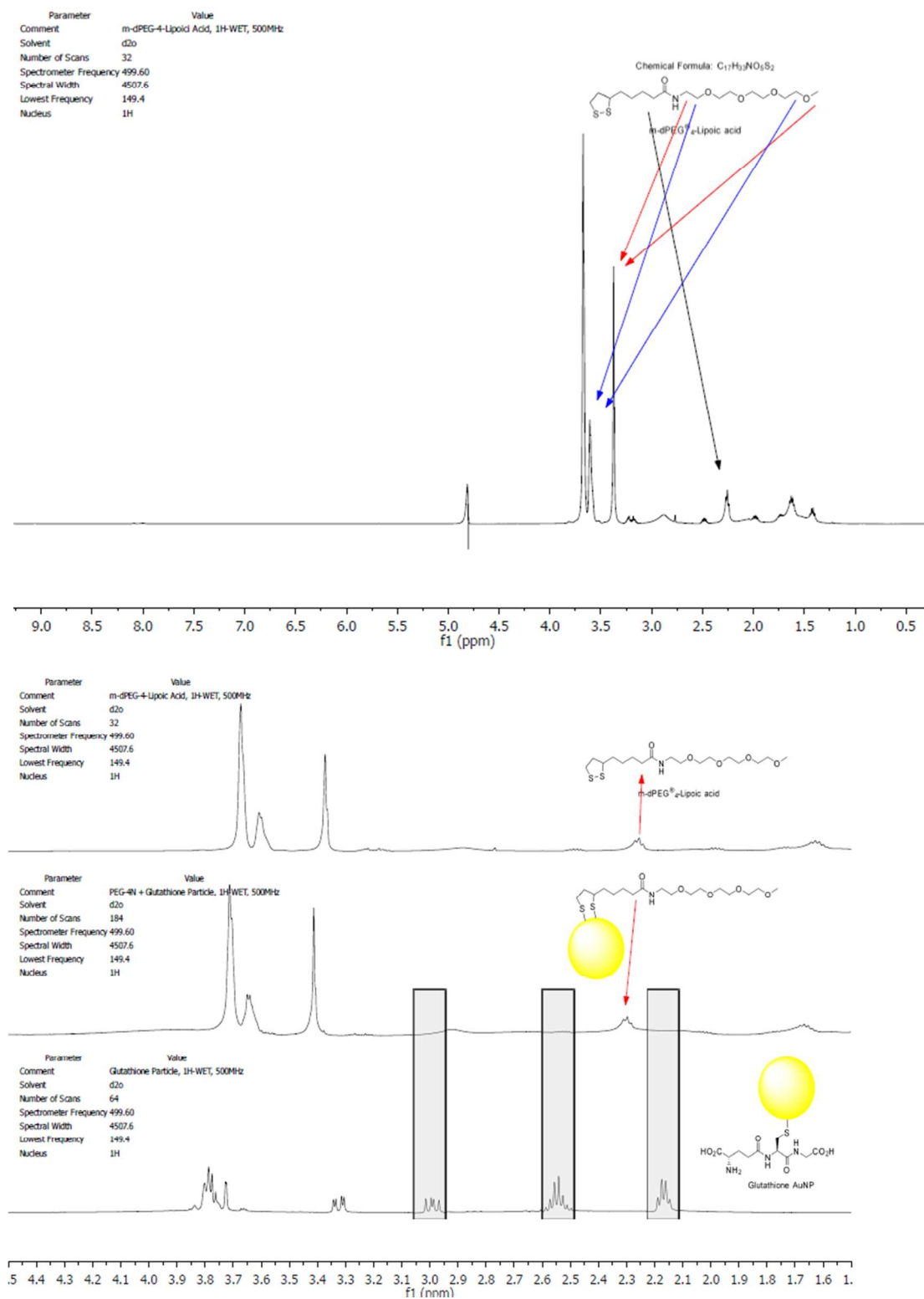


Figure S6. ^1H NMR spectra in $\text{D}_2\text{O}/\text{H}_2\text{O}$ for PEG4N ligand (top), and a stackplot of PEG4N ligand/ PEG4N Au NP/ GSH Au NP (bottom).

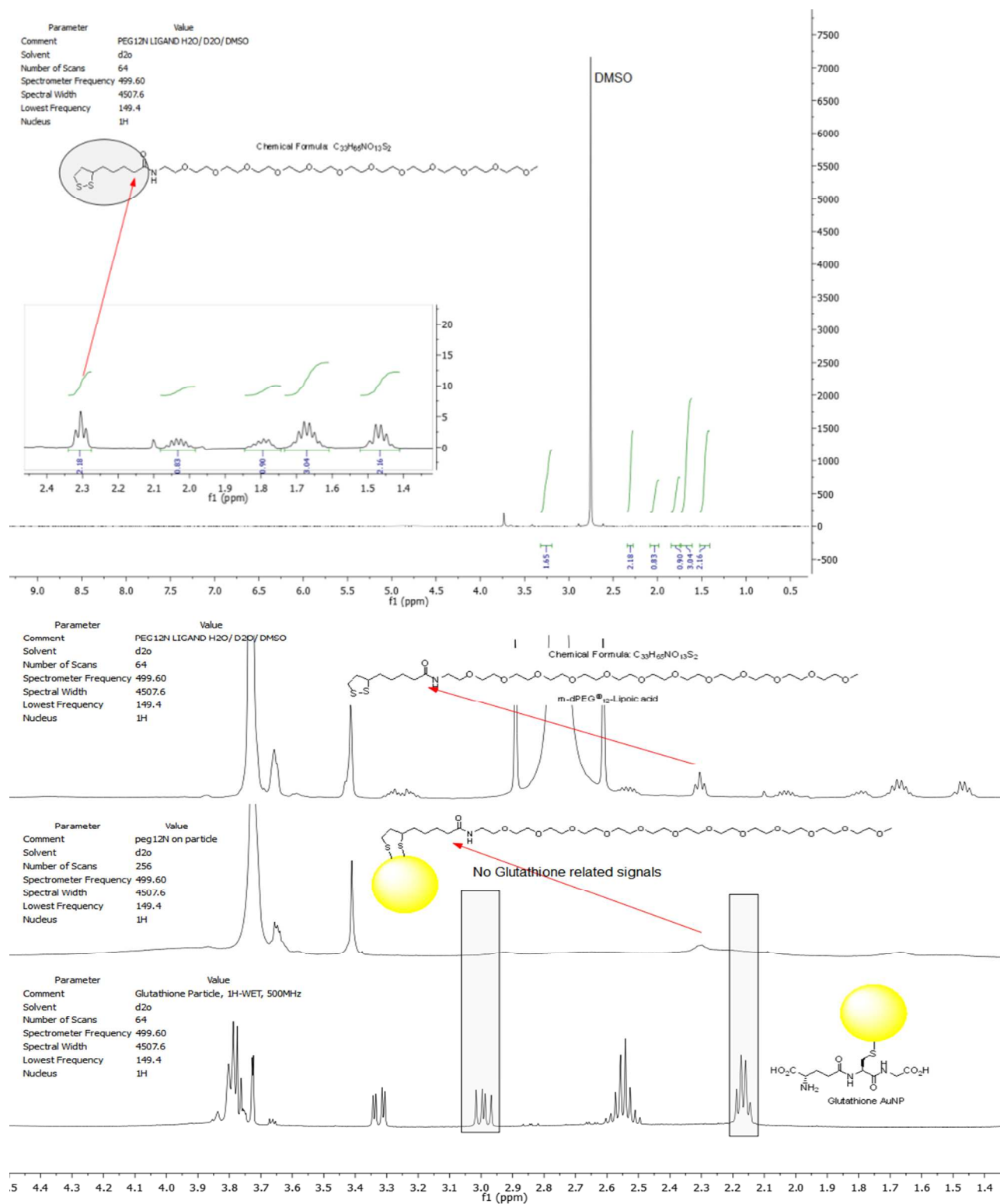


Figure S7. ^1H NMR spectra for PEG12N ligand (top), and a stackplot of PEG12N ligand/ PEG12N Au NP/ GSH Au NP (bottom).

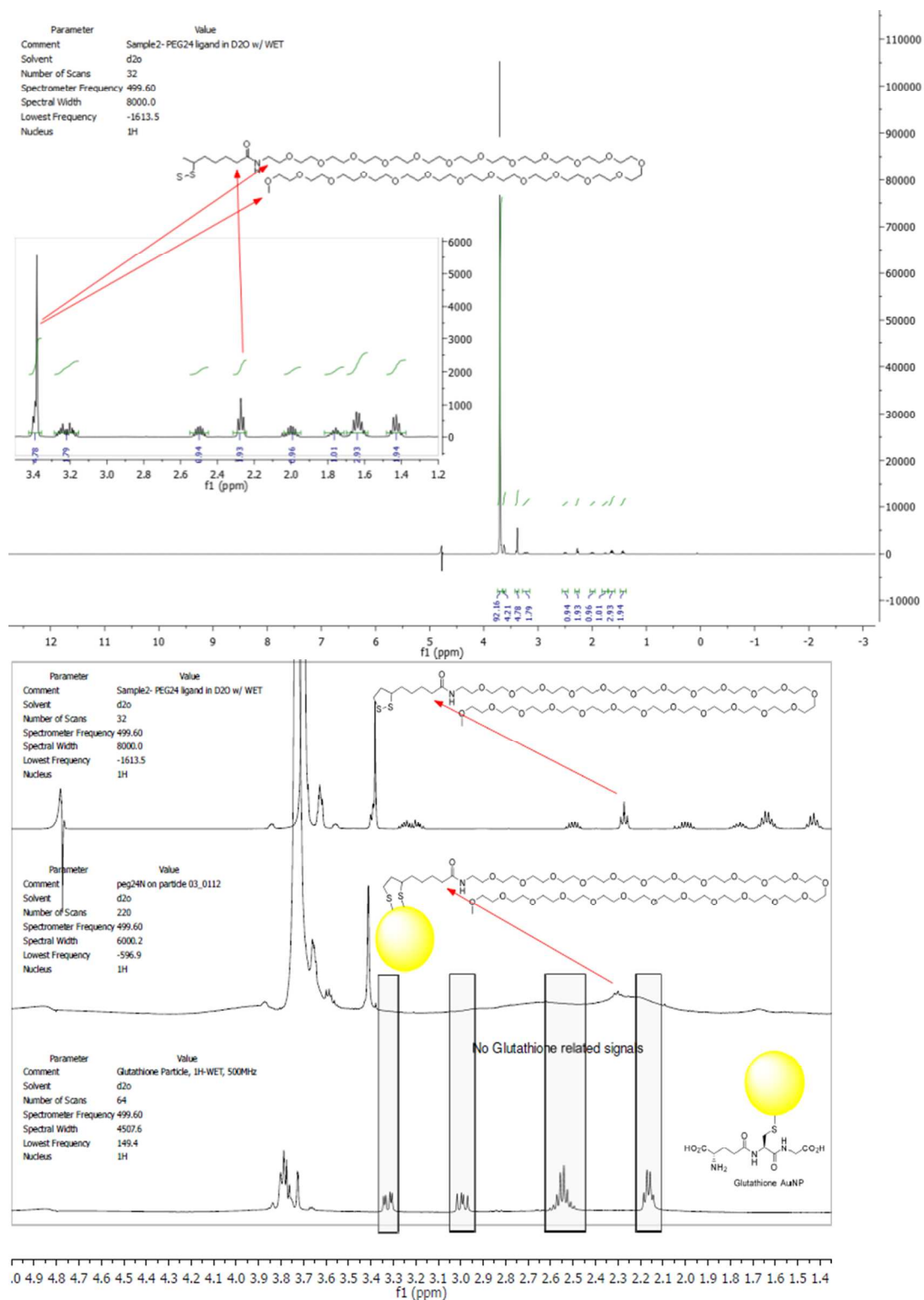
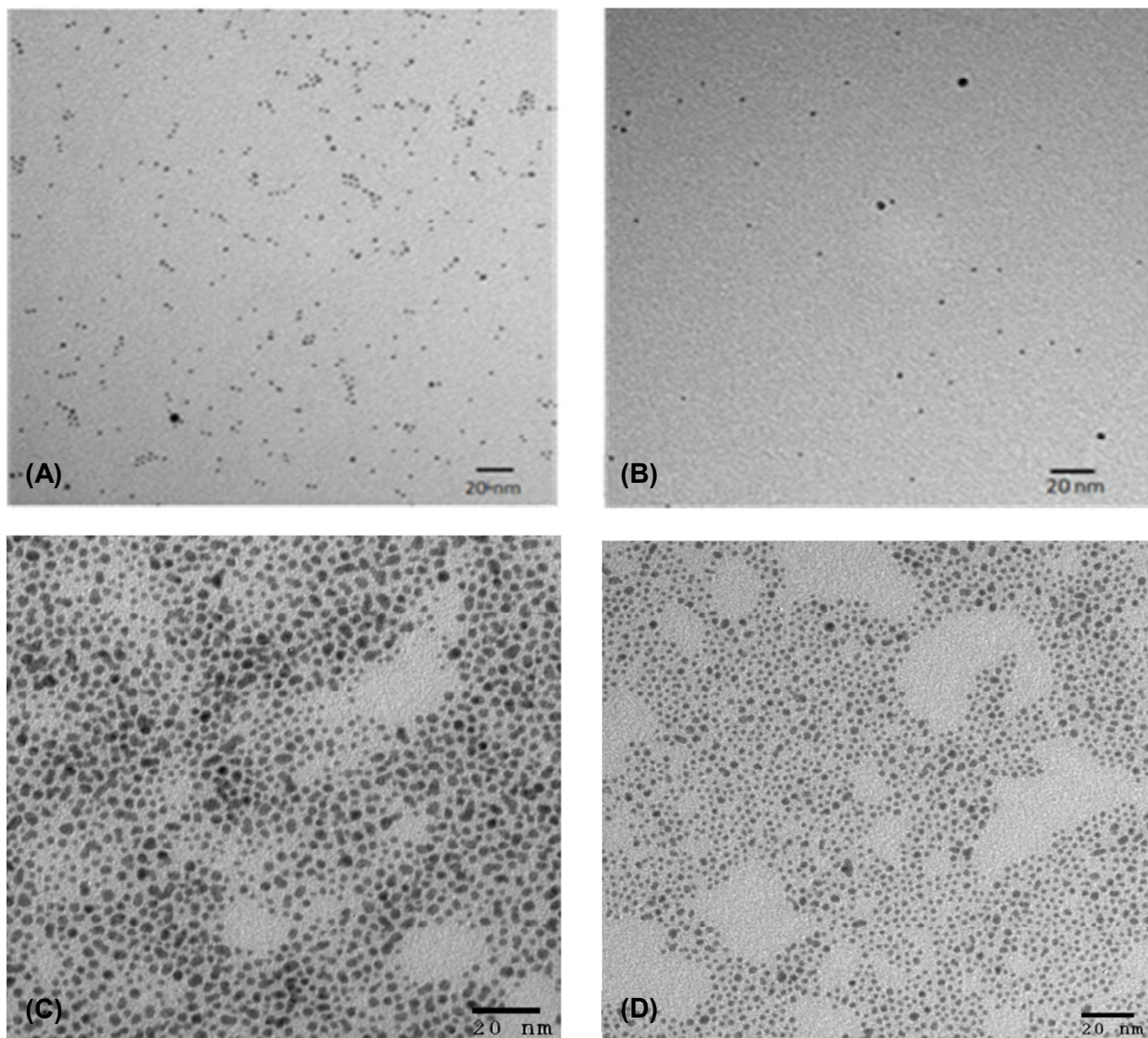


Figure S8. ^1H NMR spectra for PEG24N ligand (top), and a stackplot of PEG24N ligand/ PEG24N Au NP/ GSH Au NP (bottom).



	A	B	C	D
Mean (nm)	1.70±0.40	2.08± 0.55	1.97±0.54	1.94±0.44
Minimum	0.86	0.96	0.71	1.04
Maximum	2.80	3.61	3.78	3.22
Mode	1.72	2.29	2.31	2.10

Figure S9. Transmission electron micrographs and size dispersity statistics of gold nanoparticles modified with (A) pMBA, (B) glutathione, (C) PEG4N/glutathione, and (D) PEG24N/glutathione.

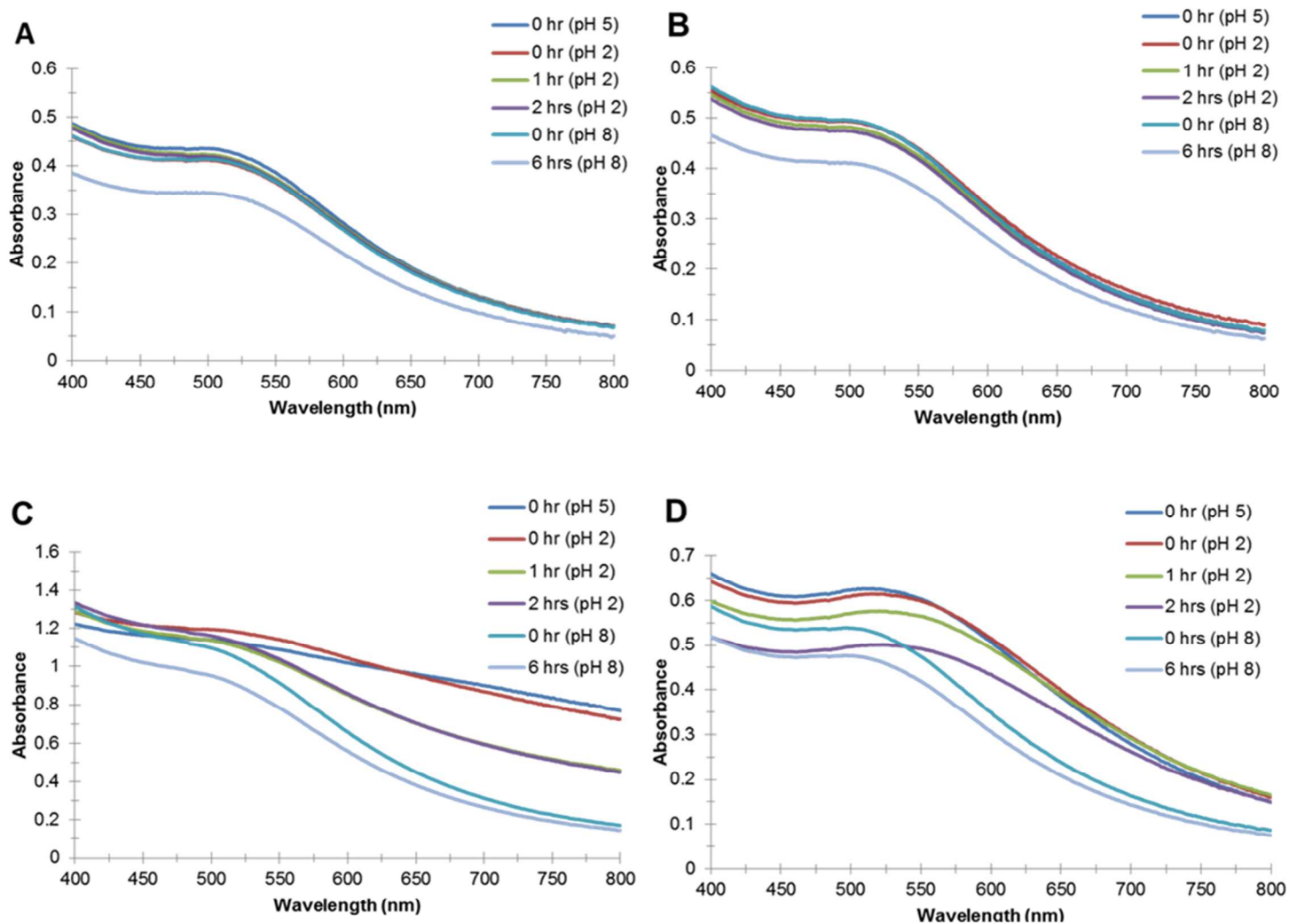


Figure S10. Gold nanoparticle stability assay simulating the pH and temperature of the human gastrointestinal tract. UV-Visible spectra of (A) PEG4-Acid, (B) PEG4-Neutral, (C) Glutathione, and (D) pMBA on ca. 2.0 nm diameter gold nanoparticles. See Experimental Methods section for details.

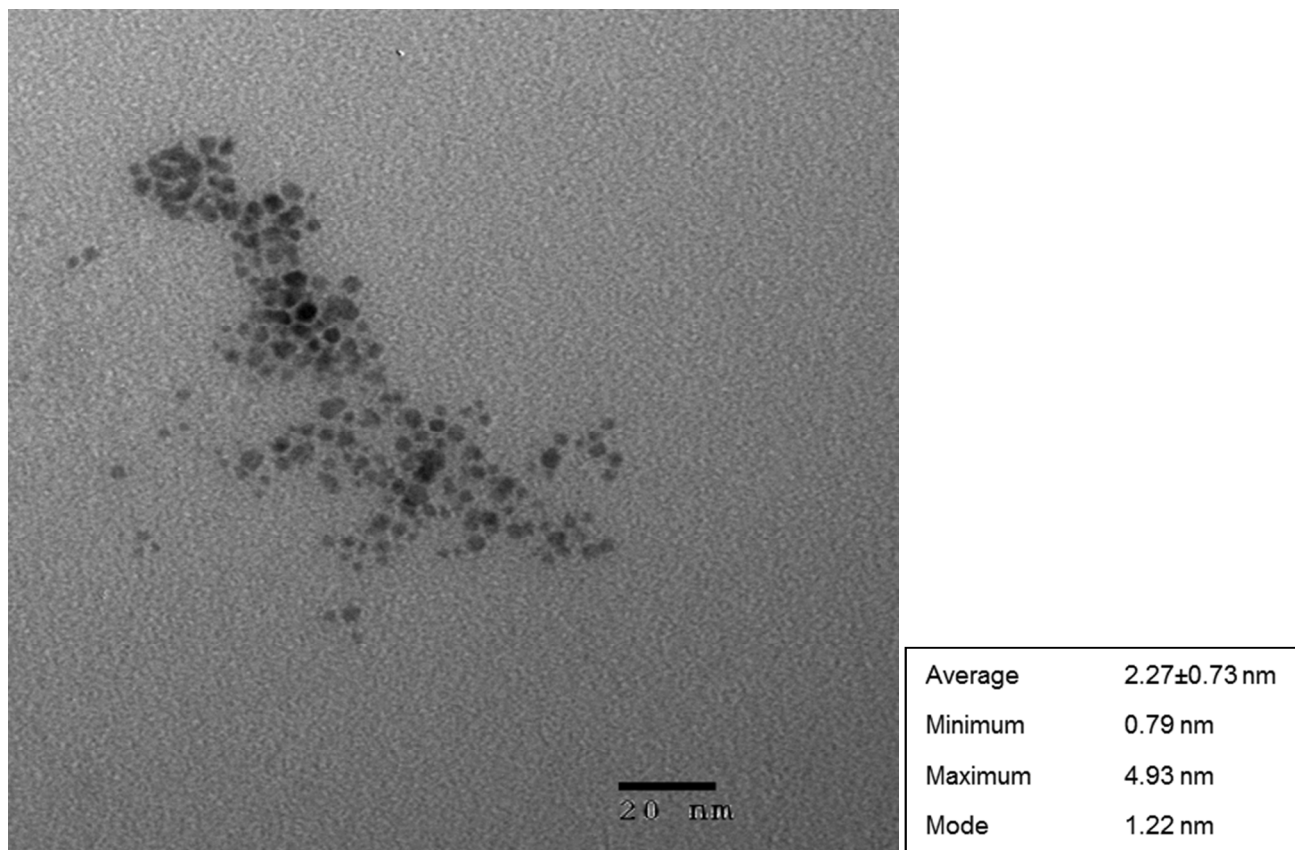


Figure S11. Analysis of mouse urine after oral administration of 60 μ M PEG4N gold nanoparticles. Transmission electron microscope image of gold nanoparticles concentrated from urine and their size dispersity.

Figure S12. Conversion for ICP-MS samples

*ICP-MS software reports in units of parts per billion (ppb) or 1 μ g/L of a solute in an aqueous solution, assuming an aqueous solution at 25°C has a density of (1 gram / 1 mL).

$$\frac{X \mu\text{g Au}}{1 \text{ mL biological sample}} = \frac{Y \mu\text{g Au}}{1 \text{ L sample}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1 \text{ mL sample}}{Z \text{ mL biological sample}}$$