Supporting Information

Radiolabeled multi-layered coated gold nanoparticles, as potential biocompatible PET/SPECT tracers

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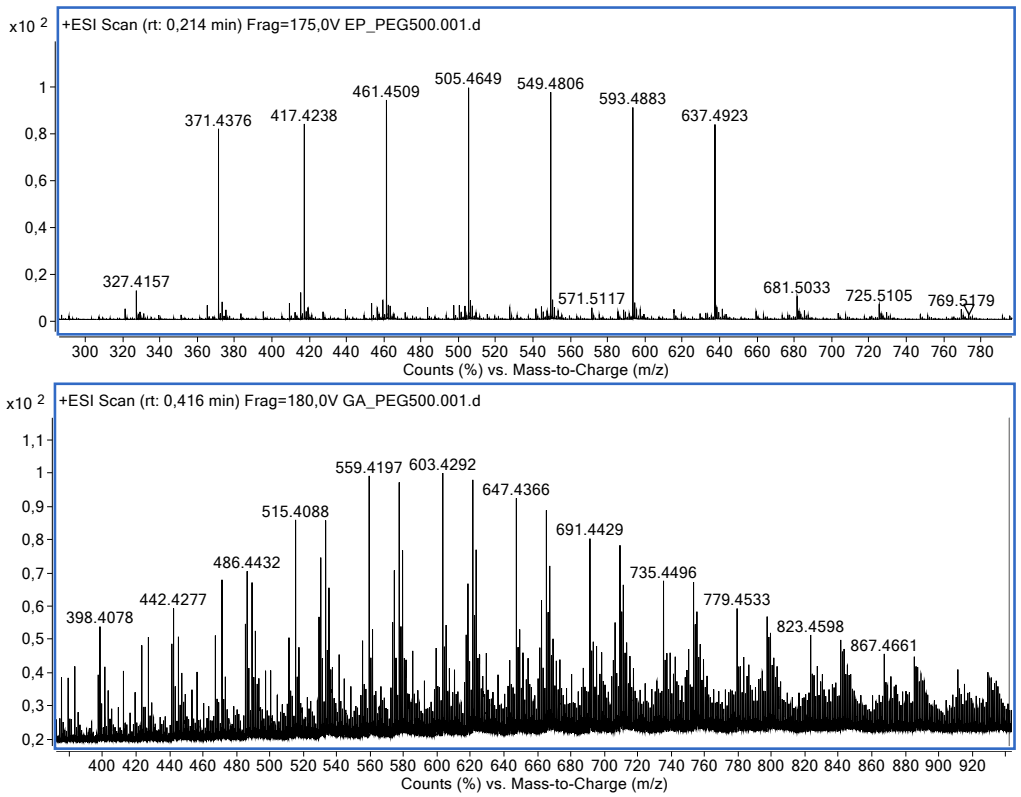


Figure S1. (+) ESI mass spectrum of PEG_{500} diglycidyl ether (upper picture) and the target product GA-PEG_{500}-epoxy (bottom picture)

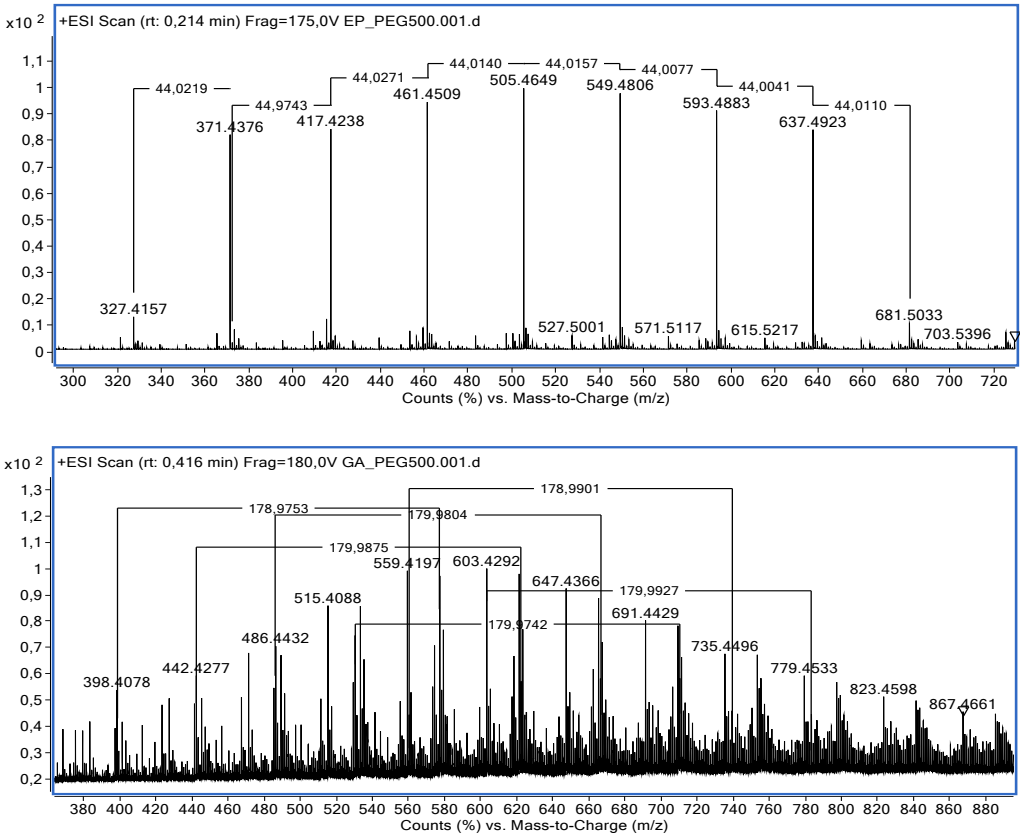


Figure S2. Detailed (+) ESI mass spectrum highlighting the series of peaks of the analyzed compounds PEG_{500} diglycidyl ether (upper picture) and GA-PEG_{500}-epoxy (bottom picture)

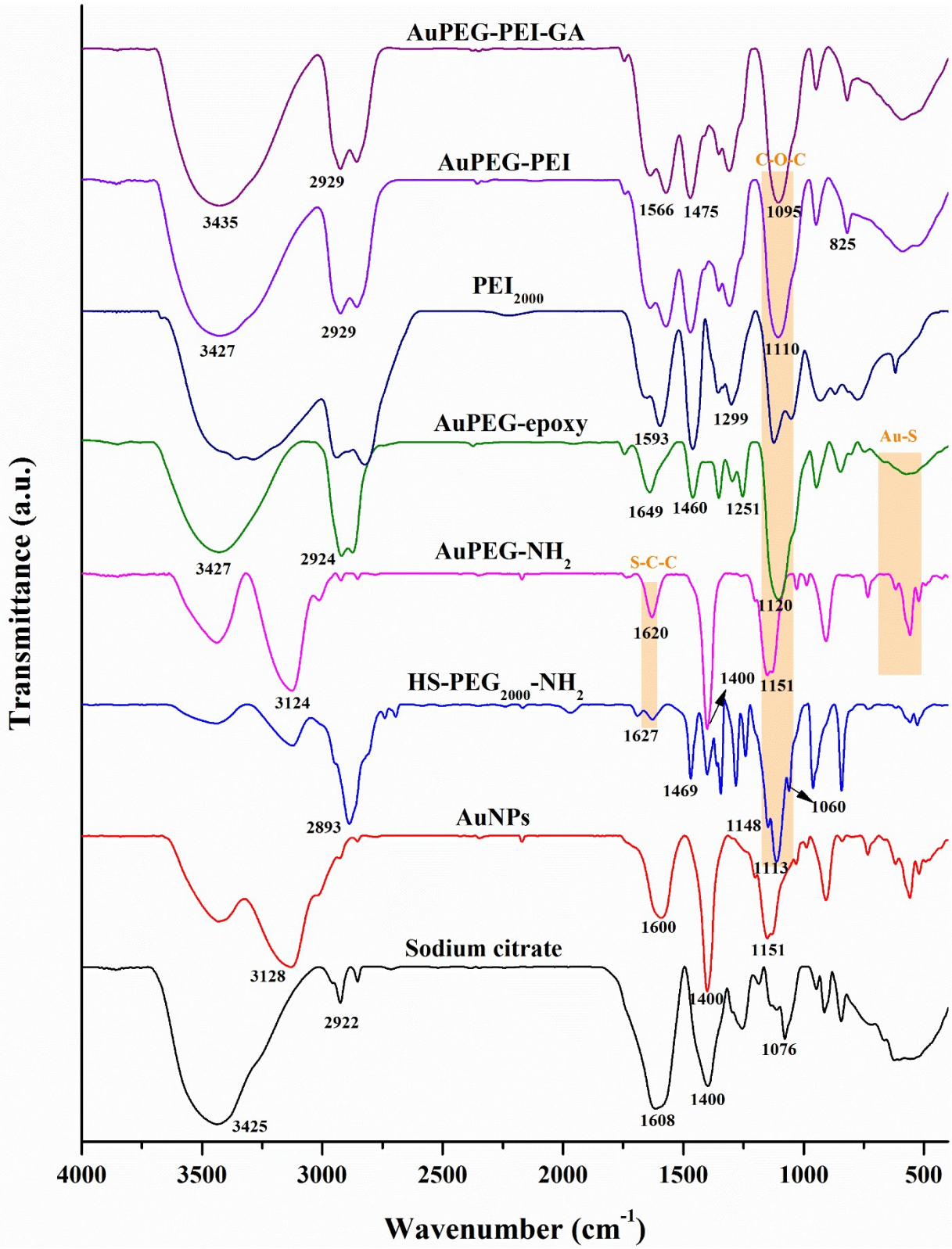


Figure S3. FTIR spectra of AuNPs, sodium citrate, HS-PEG-NH_2, AuPEG-NH_2, AuPEG-epoxy, AuPEG-PEI and AuPEG-PEI-GA

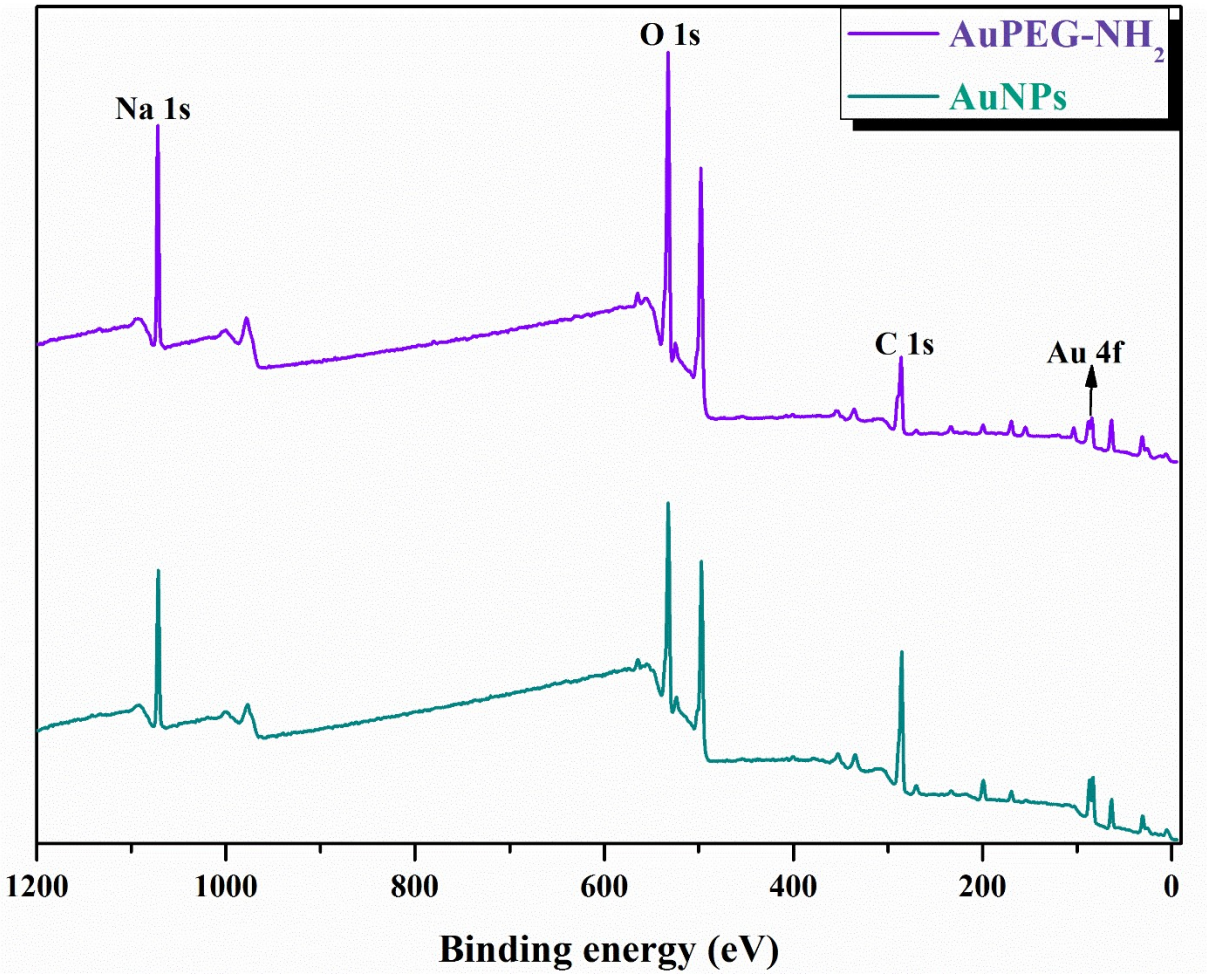


Figure S4. XPS wide scans of AuNPs and AuPEG-NH_2

Table S1. XPS elemental quantification

	AuNPs	**AuPEG-NH_2**
Element	**Atomic conc. [%]**	**Atomic conc. [%]**
Au 4f	1,07	0,71
C 1s	55,69	38,01
O 1s	32,52	44,93
Na 1s	10,72	14,06
S 2p		1,96
N 1s		0,33

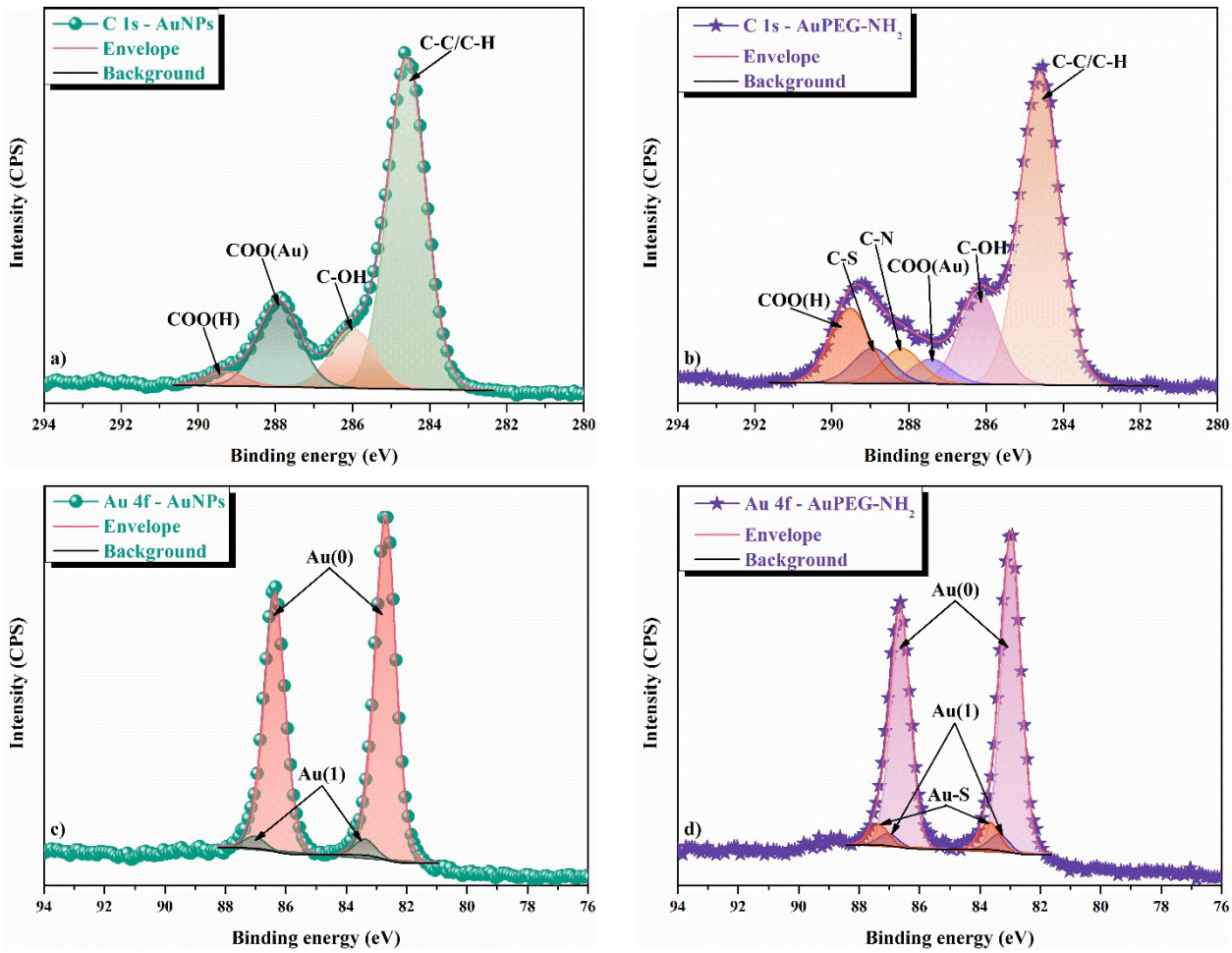


Figure S5. C 1s and Au 4f XPS high resolution spectra of AuNPs and AuPEG-NH_2

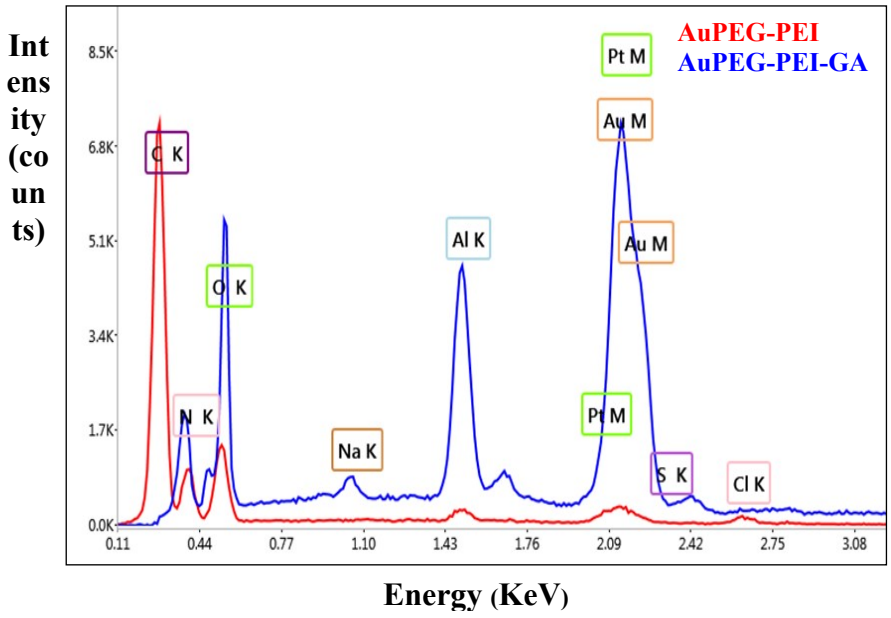


Figure S6. EDAX spectra of AuPEG-PEI and AuPEG-PEI-GA

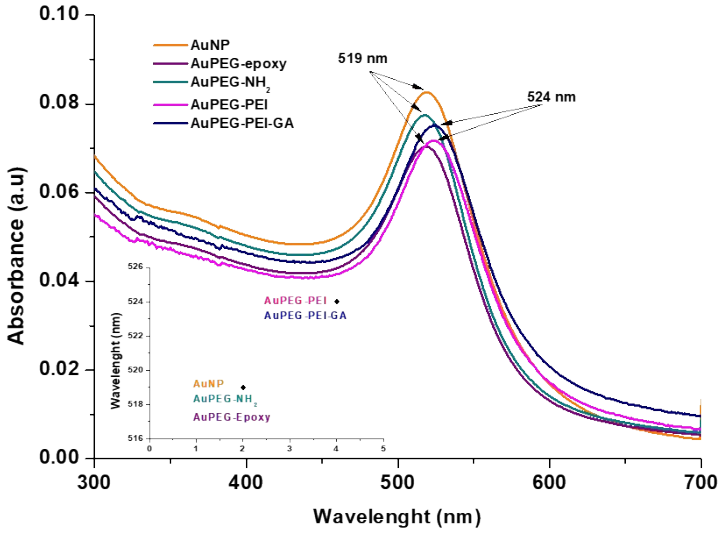


Figure S7. The ultraviolet-visible spectroscopy spectrum of AuNPs, AuPEG-NH_2, AuPEG-epoxy, AuPEG-PEI, and AuPEG-PEI-GA conjugates. The inserted figure represents the variation of wavelengths vs. the chemical structure of conjugates

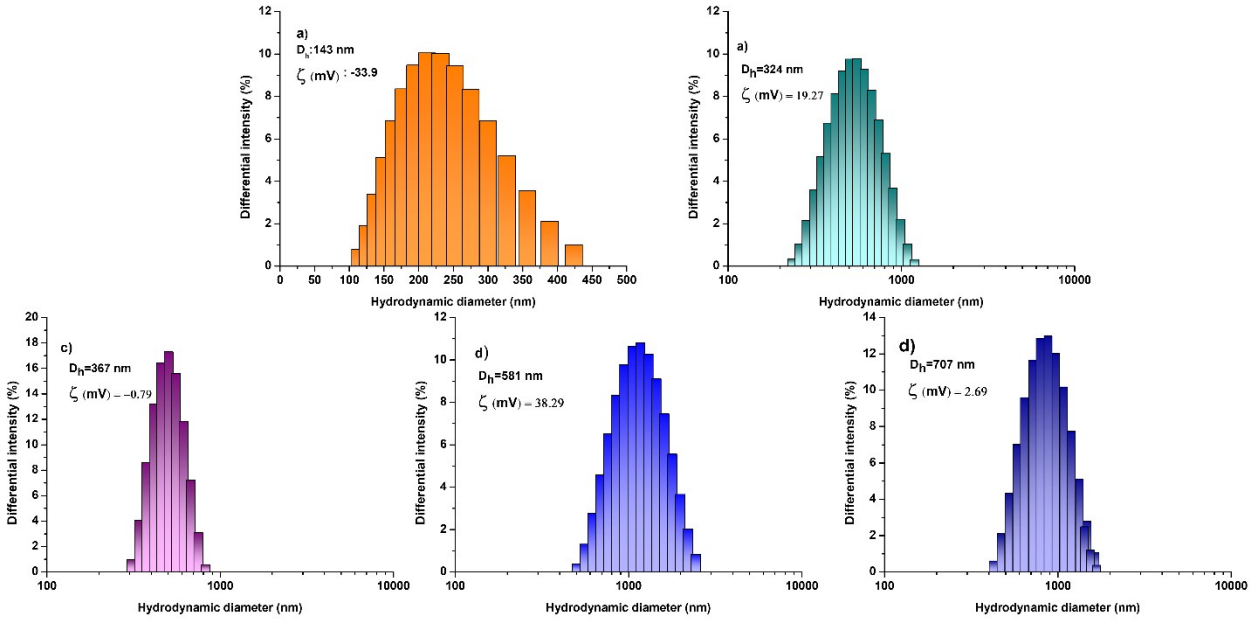


Figure S8. The hydrodynamic diameter (D_h) of AuNPs (a), AuPEG-NH_2 (b), AuPEG-epoxy (c), AuPEG-PEI (d), and AuPEG-PEI-GA (e). Each zeta potential value (ξ) is presented in the inserts

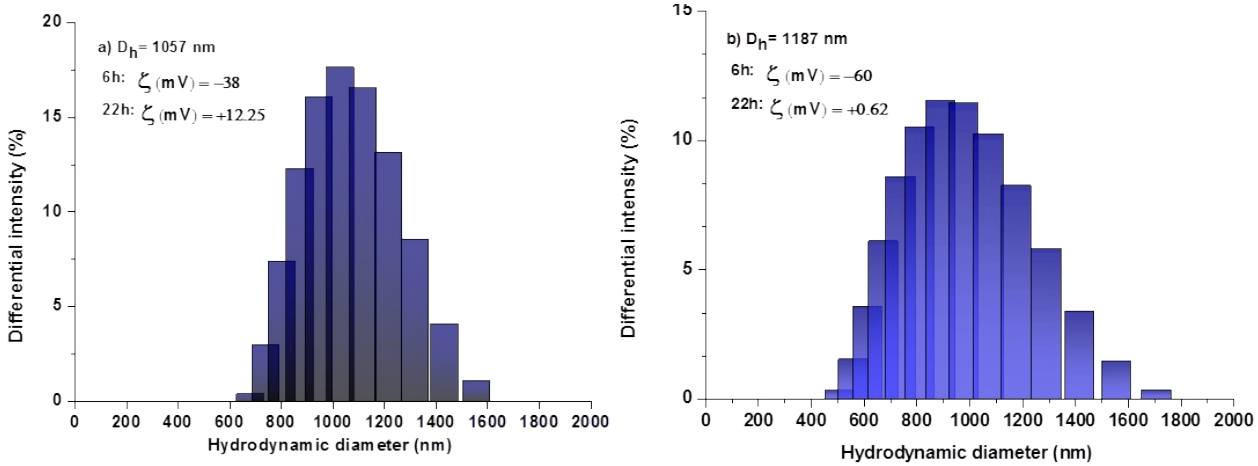
The estimated calculation of the number of gold atoms/gold nanosphere

$$V_{sphere} = \frac{\pi D^3}{6} = 904.32 \text{ nm}^3 \quad \text{(S1)}$$

$$V_{Au} = \frac{\pi D_{Au}{}^3}{6} = 0.0125 \text{ nm}^3 \quad \text{(S2)}$$

$$N = \frac{V_{sphere}}{V_{Au}} = 72345.6 \quad \text{(S3)}$$

where: V_{sphere} is the average volume of AuNPs, covered with citrate; D = 12 nm is the average AuNP diameter measured by STEM; V_{Au} is the volume of the gold atom; and D_{Au} = 0.288 nm represents the diameter of the gold atom[7].



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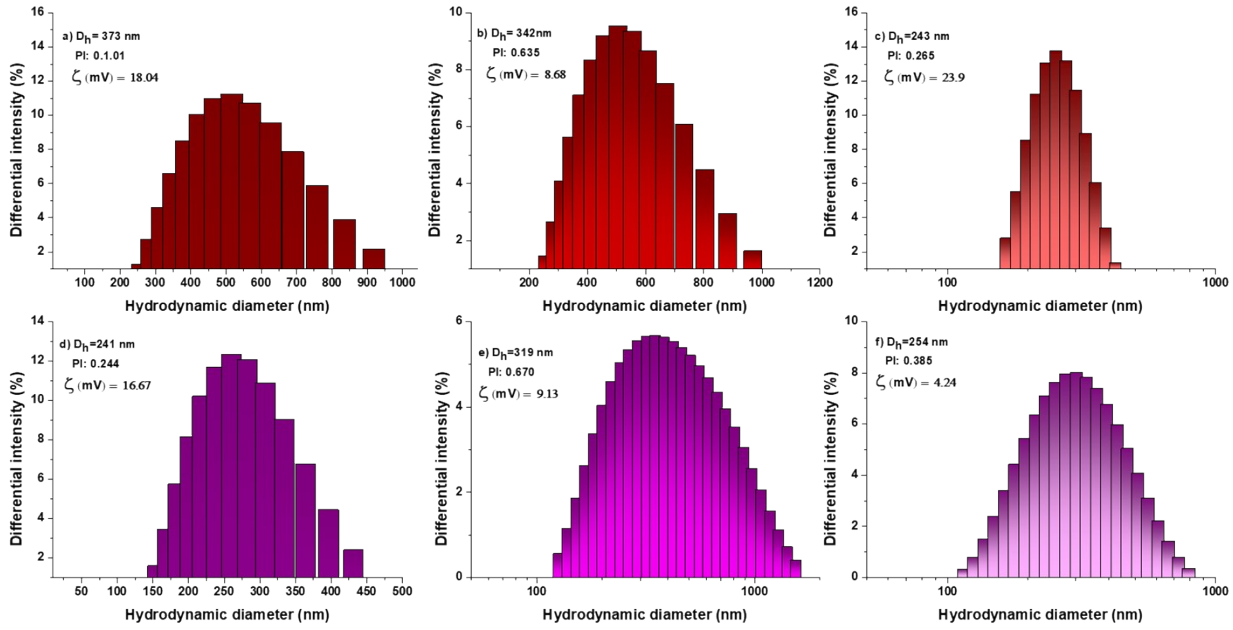

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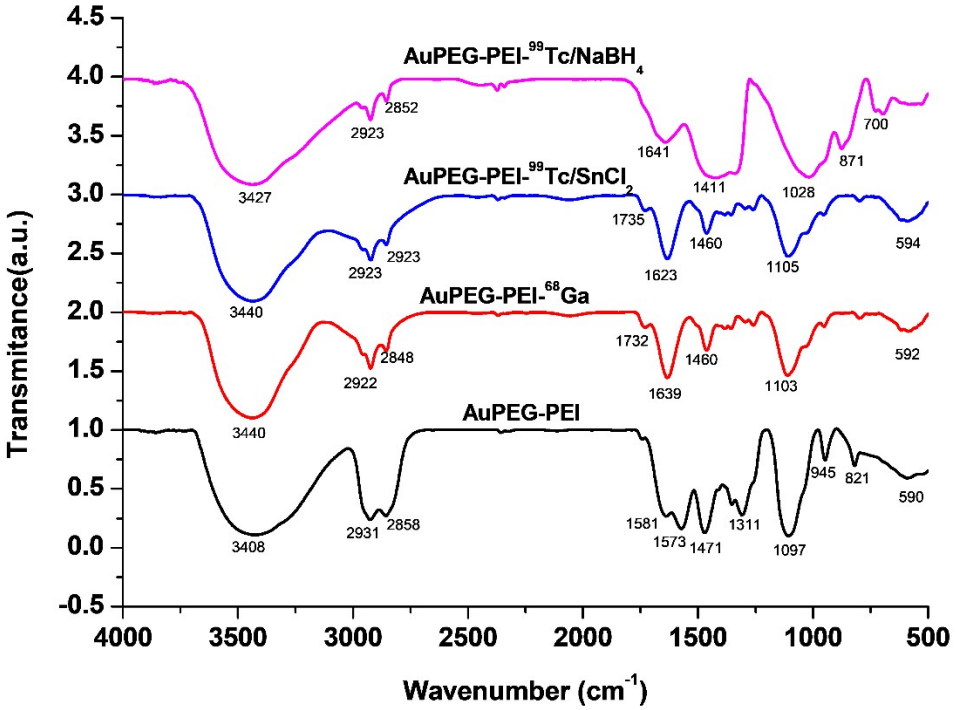

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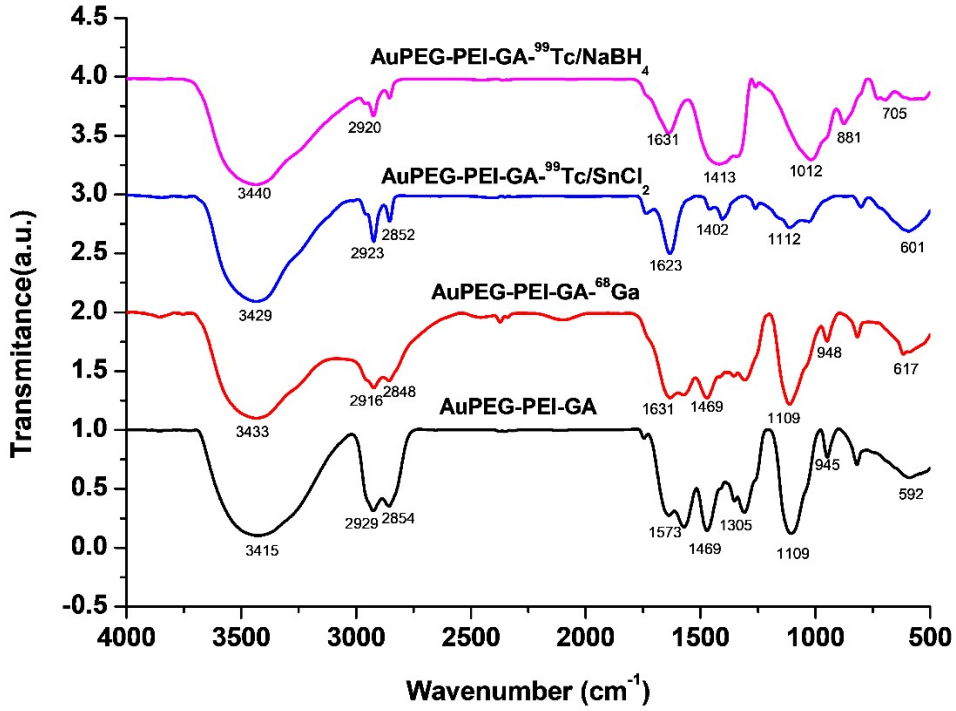

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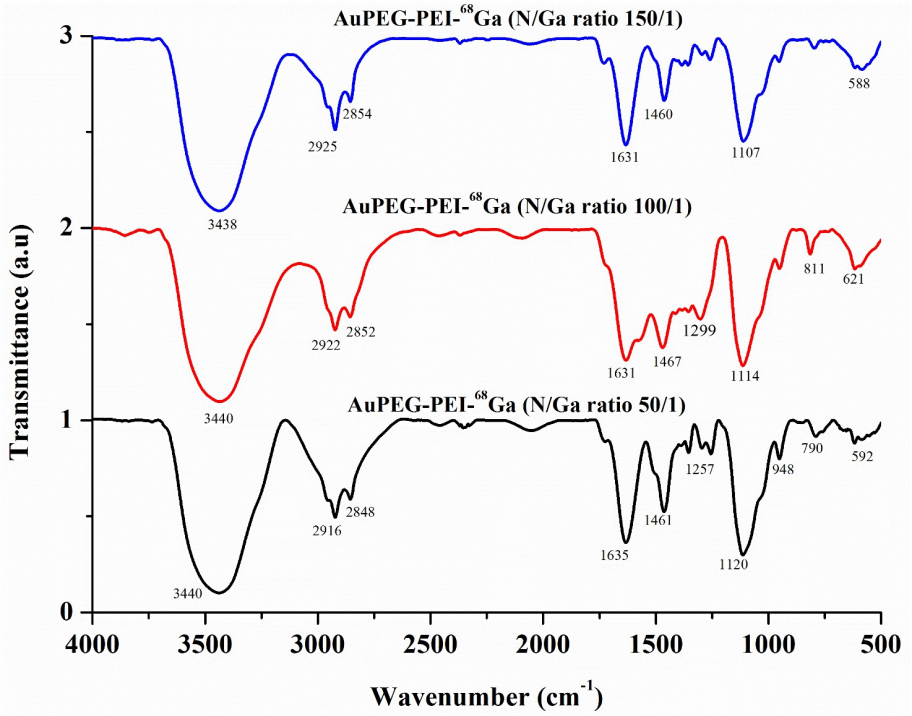


Figure S13. Comparison between three different concentrations of gold nanoparticles and $^{68}Ga^{3+}$ complex for sample AuPEG-PEI at N / Ga ratios of 50 / 1, 100 / 1, and 150 / 1

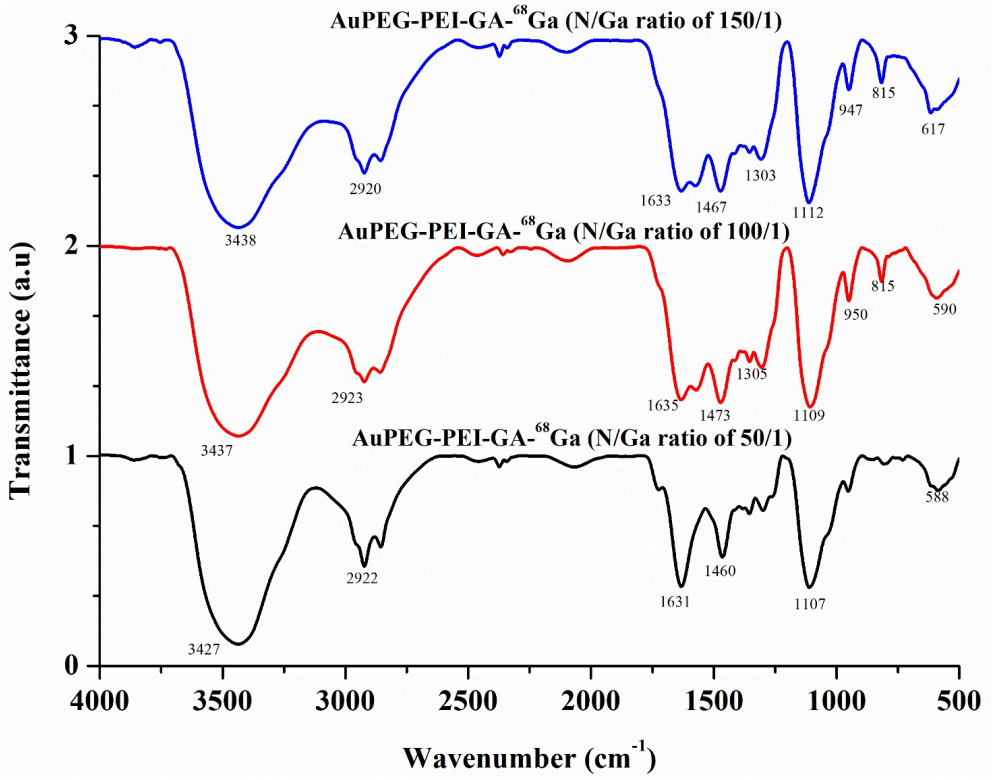
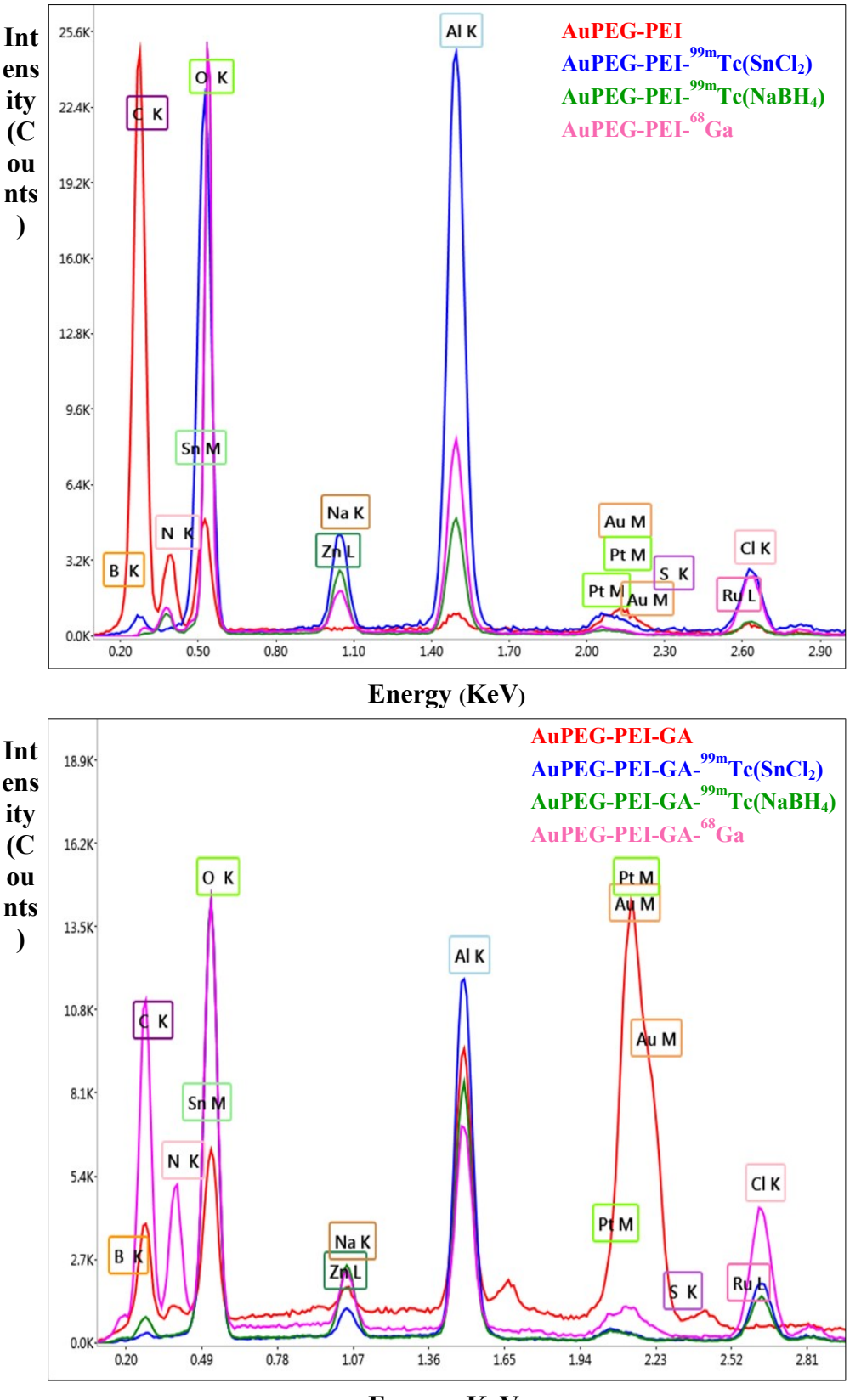


Figure S14. Comparison between three different concentrations of gold nanoparticles and $^{68}Ga^{3+}$ complex for sample AuPEG-PEI-GA at N / Ga ratios of 50 / 1, 100 / 1, and 150 / 1



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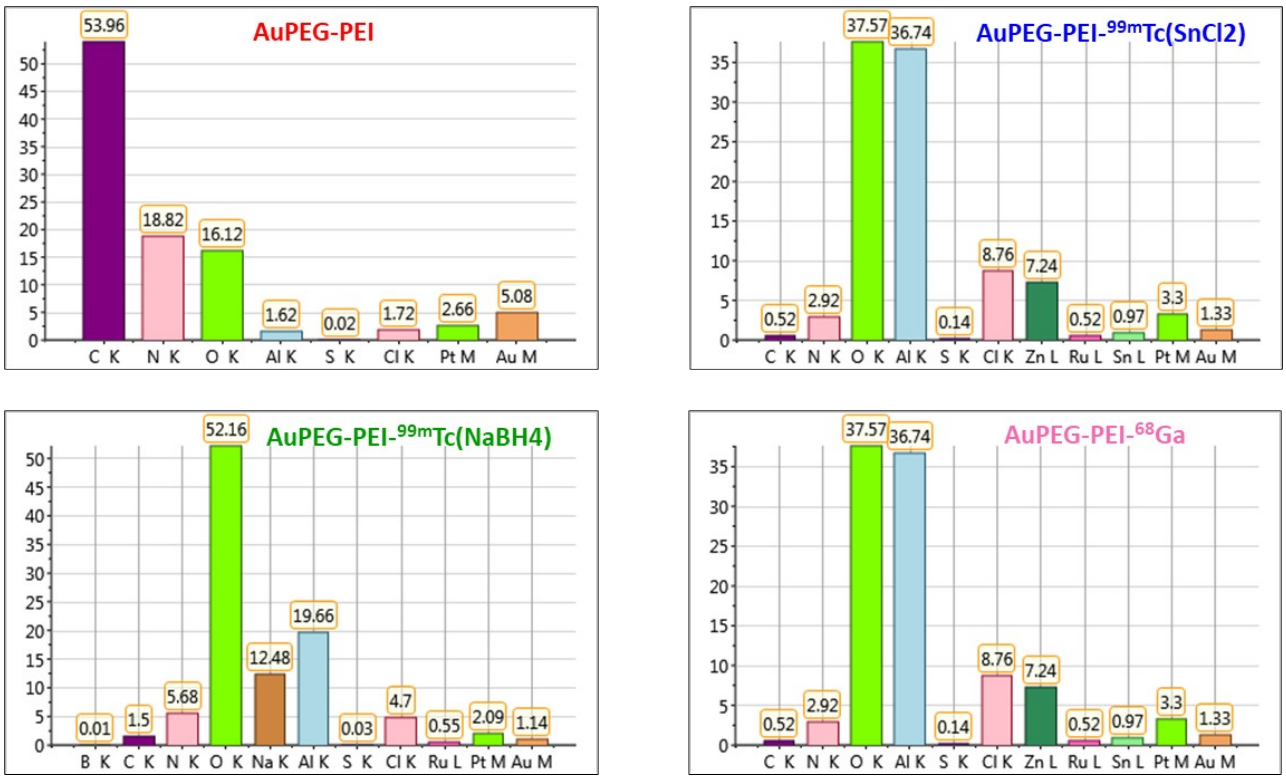

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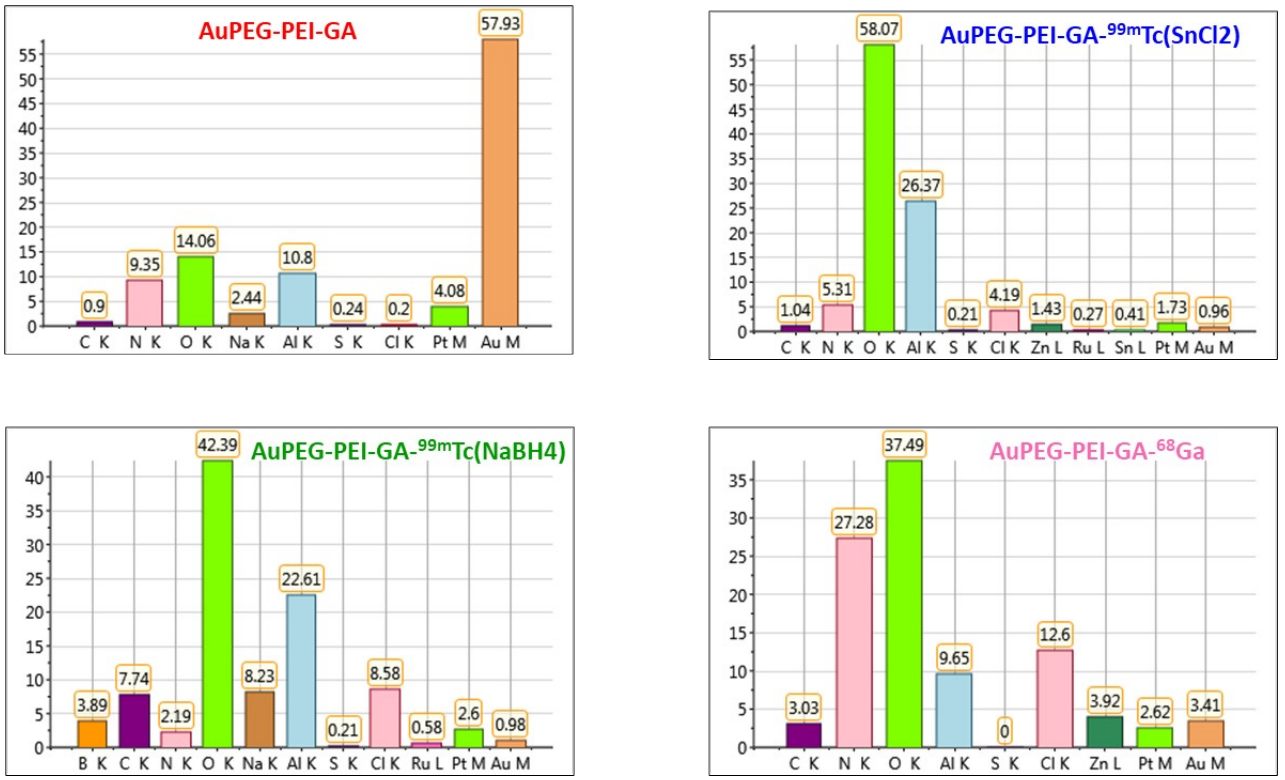

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