

SUPPORTING INFORMATION

Impacts of Polyethylene glycol (PEG) Dispersity on Protein Adsorption, Pharmacokinetic, and Biodistribution of PEGylated Gold Nanoparticles

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The MALDI-TOF mass spectra of the raw material mPEG-HS are shown in Figure S1(a, b, and c). Due to the reactivity of the thiol group, mPEG₃₆-HS and mPEG₄₅-HS show several unexplained mass peaks, but this does not affect their monodisperse characteristics.

Therefore, we characterized the starting material mPEG-OH for the synthesis of mPEG-HS using MALDI-TOF mass spectrometry, as shown in Figure S1(d, e, and f). Since modifying the end groups of PEG does not change its molecular weight distribution, we infer that mPEG-HS derived from monodisperse mPEG-OH remains monodisperse, while mPEG-HS derived from polydisperse mPEG2k-OH remains polydisperse. From the MALDI-TOF mass spectra of mPEG-OH, it can be seen that the mass spectrum of mPEG₃₆-OH (Figure S1 e) is very clean, with molecular ion peaks [M+Na]⁺ at 1640.9 and [M+K]⁺ at 1656.9, which match the calculated molecular weight 1617.9 Da. Similarly, the mass spectrum of mPEG₄₅-OH (Figure S1 f) shows molecular ion peaks [M+Na]⁺ at 2037.4 and [M+K]⁺ at 2053.4, which match the calculated molecular weight 2014.9 Da. The MALDI-TOF mass spectrum of polydisperse mPEG2k-OH shows a broad normal distribution of molecular weights, ranging from 1500-2500 Da.

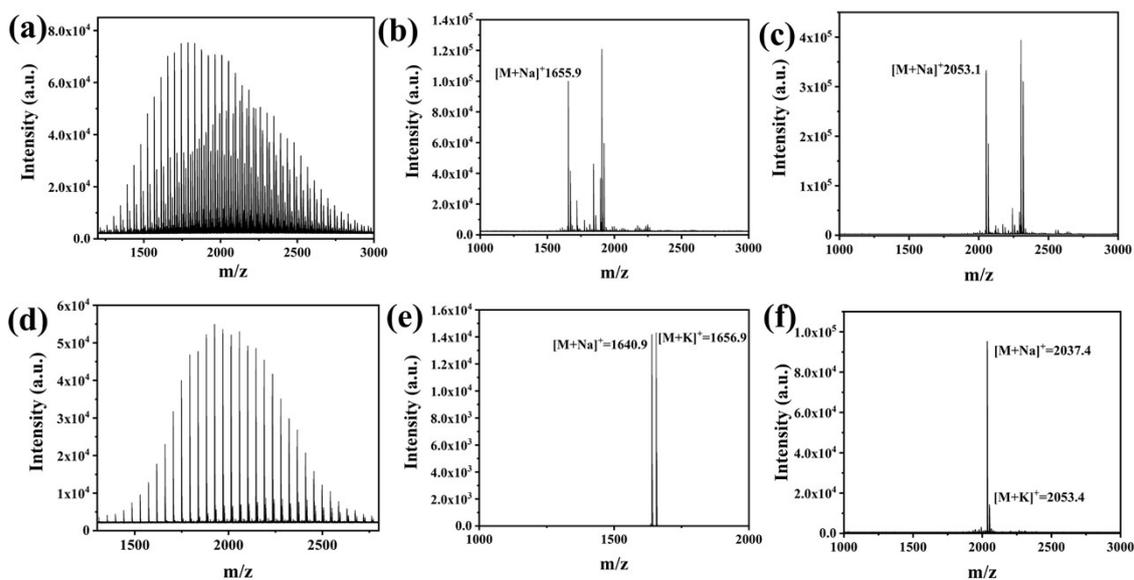


Figure S1 MALDI-TOF spectra of (a) mPEG2k-HS; (b) mPEG₃₆-HS; (c) mPEG₄₅-HS; (d) mPEG2k-OH; (e) mPEG₃₆-OH; (f) mPEG₄₅-OH.

The grafting density (σ) can be calculated with the following equation: The mass fraction of polyethylene glycol ($W_{PEG}\%$) and gold nanonucleus ($W_{Au}\%$) was known from the TGA (Figure S1) data. The average radius (R_{Au}) of the CTAB-capped AuNPs was 22.7 ± 2.0 nm. The density of bulk gold (ρ_{Au}) is 19.3 g/cm^3 . NA is the Avogadro number. MW_{PEG} was the relative molecular mass of mPEG-SH.

$$\sigma = \frac{\frac{4}{3}\pi R_{Au}^3 W_{PEG}\% \rho_{Au} N_A}{4\pi R_{Au}^2 W_{Au}\% MW_{PEG}}$$

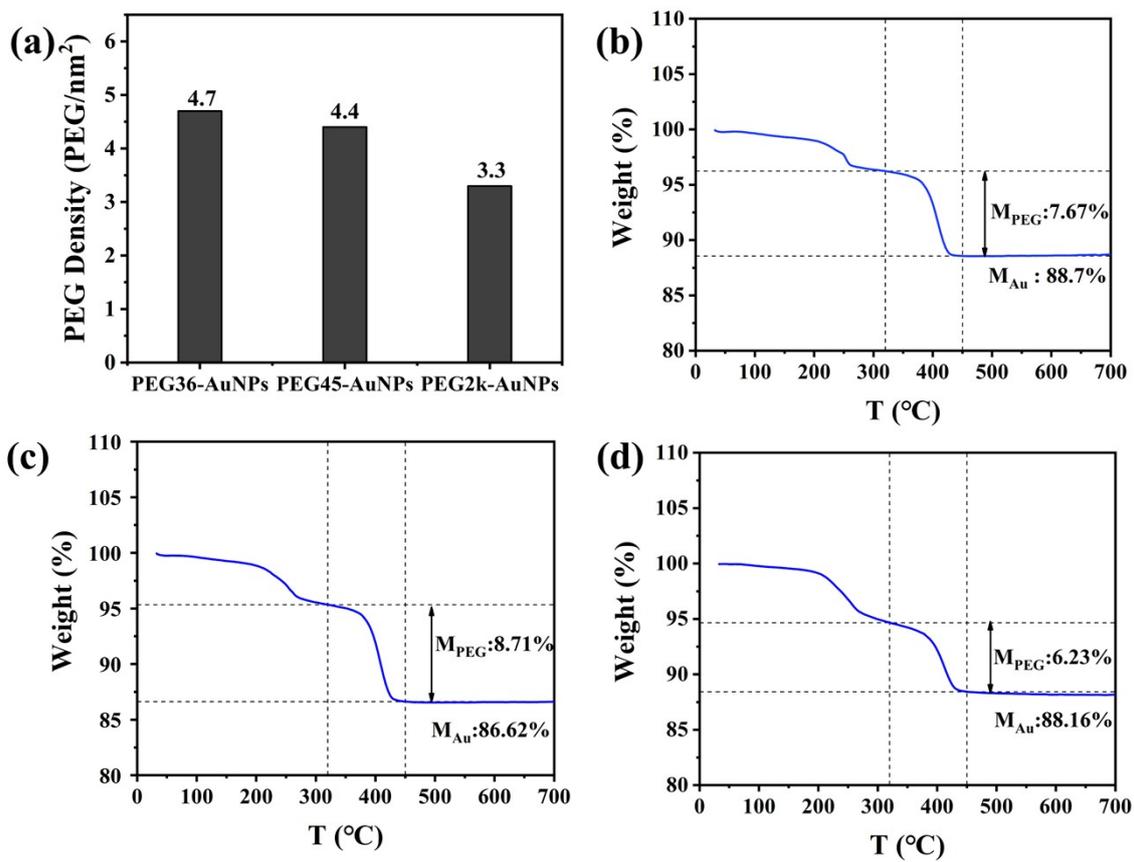


Figure S2 (a) Grafting density of PEG on the surface of AuNPs; TGA curves of (b) PEG₃₆-AuNPs; (c) PEG₄₅-AuNPs; (d) PEG_{2k}-AuNPs.