Supporting Information

Gold Nanoparticles as a Probe for Amyloid-β Oligomer and Amyloid Formation

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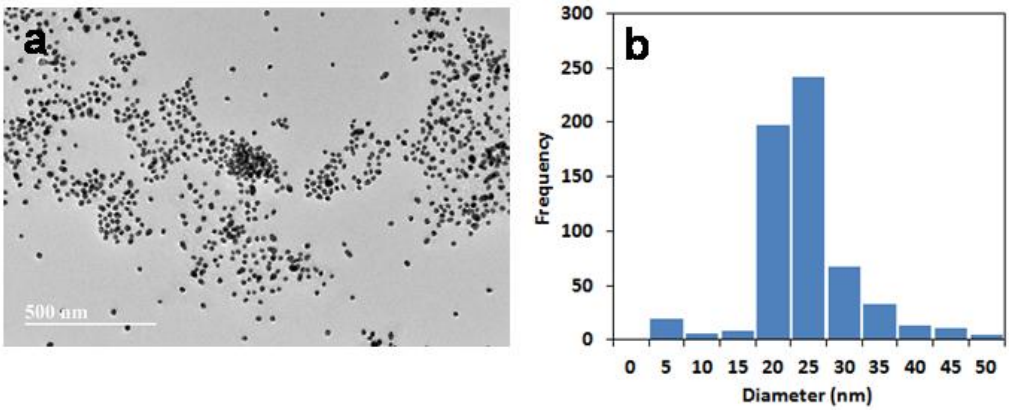

Figure S1. (a) TEM image of citrate-stabilized AuNPs. (b) Size distribution histogram of AuNPs, which shows an average diameter of ~23 nm (image population: 604 particles). Size analysis was performed from the TEM image using ImageJ software (imagej.nih.gov).

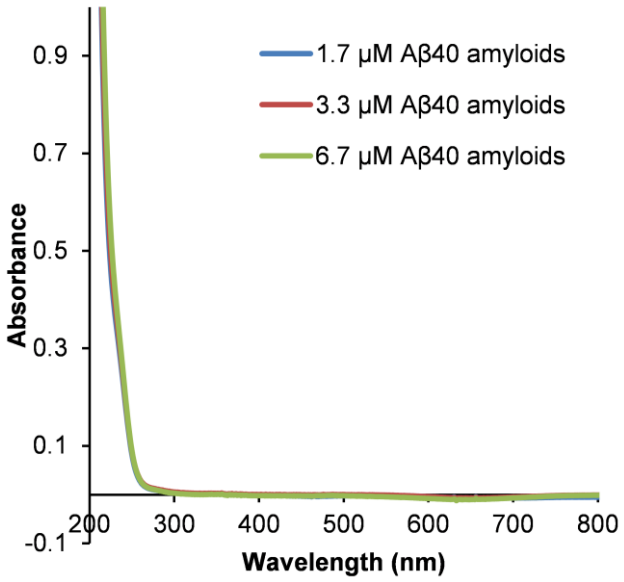

Figure S2. UV-Vis spectra of the preformed Aβ40 amyloids. The spectra of Aβ40 amyloids at different concentrations were measured.

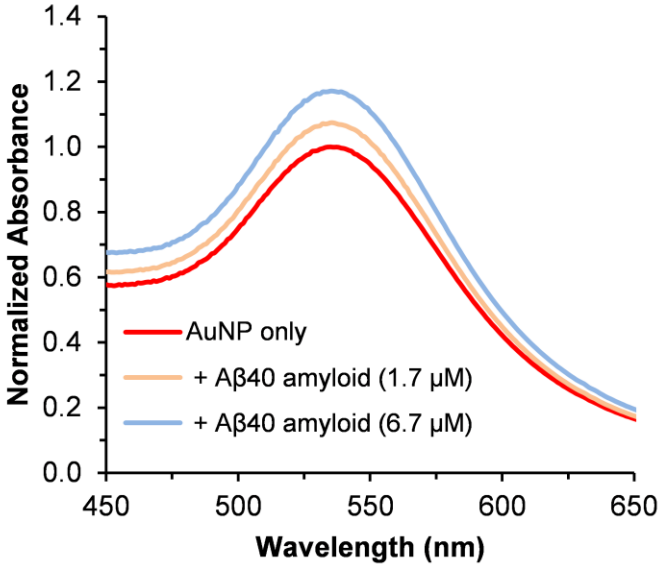

Figure S3. UV-Vis spectra of AuNPs (0.41 nM). The AuNPs were co-incubated with the indicated amount of preformed Aβ40 amyloids in pH 7.4 phosphate buffer, and the UV-Vis spectra were measured after 2 h incubation.

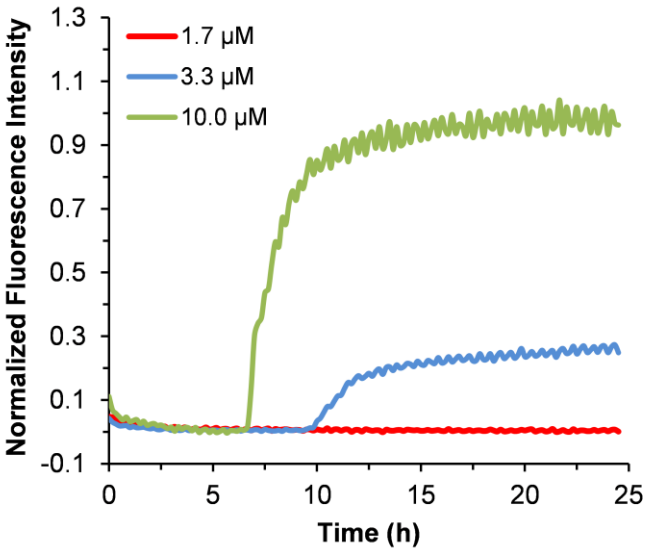

Figure S4. Aggregation kinetics of Aβ40 followed by ThT fluorescence in pH 7.4 phosphate buffer at 37 ^{o}C.

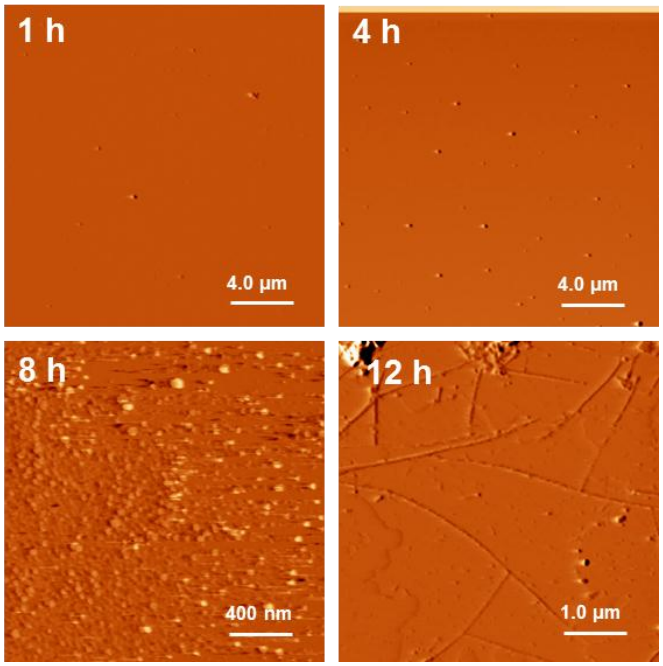

Figure S5. Time-dependent AFM images of Aβ40. Aβ40 monomer (10 μM) was incubated in pH 7.4 phosphate buffer (50 mM Na phosphate, 150 mM NaCl) at room temperature, and AFM images were measured at a specific time point of incubation.

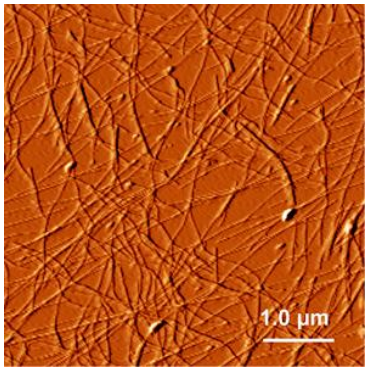

Figure S6. AFM image of Aβ40 amyloids. Aβ40 (30 μM) was incubated in pH 7.4 phosphate buffer (50 mM Na phosphate, 150 mM NaCl) at 37 ^{o}C for 5 d before being scanned.

Supplementary Methods

Materials. Hydrogen tetrachloroaurate (III) trihydrate ($HAuCl_4.3H_2O$, MW 393.83 g/mol, 99.999%) and sodium citrate tribasic dihydrate ($C_6H_5Na_3O_7.2H_2O$, MW 294.10 g/mol, 99%) were purchased from Sigma-Aldrich. Amino acids were purchased from Protein Technologies Inc. All other chemical reagents were obtained from commercial suppliers and used without further purification unless otherwise mentioned. Millipore water was used in preparation of all aqueous solutions.

Determination of molar concentration of AuNPs. The concentration of AuNPs used in the assay was calculated using the method reported by X. Liu *et al.*[1], using the equation $C = N_{Total}/NVN_A$, where N_{Total} is the total number of gold atoms present in 1 mL of 12.7 mM gold salt solution originally used, N_A is Avogadro's number, V is reaction volume in Liters (0.050 L), and N is the average number of gold atoms per every nanoparticle. Assuming 100% conversion of Au(III) to Au atoms and uniform spherical nanoparticles, N can be calculated using the equation $N = \pi\rho D^3/6M$ where ρ is fcc gold density (19320 g/L), D is nanoparticle diameter determined using TEM, and M is the atomic weight of gold (197 g/mol).

Zeta potential measurement. Zeta potential measurement was performed using a model Zetasizer Nano ZS instrument (Malvern Instruments, Worcestershire, UK) with a disposable polycarbonate folded capillary cell (model DTS1070) with a path length of 4 mm. A 1 mL sample of plain AuNPs was used for the measurement.

References:

1. Liu, X., Atwater, M., Wang, J. ; Huo, Q. Extinction coefficient of gold nanoparticles with different sizes and different capping ligands, *Colloids Surf. B. Biointerfaces* **2007,** *58*, 3-7.