Supporting Information

Experimental

Chemicals and Materials: Hydrogen tetrachloroaurate(III) ($HAuCl_4.3H_2O$), 99.99%, and sodium citrate dihydrate ($Na_3C_6H_5O_7{\cdot}2H_2O$), 99%, were purchased from Alfa Aesar and used without further purification. All other chemicals were purchased from Sigma-Aldrich and used as supplied. The oligonucleotides used in this paper were synthesized by Sangon Biotechnology Inc. (Shanghai, China). Nanopure water (18.2 MΩ; Millpore Co., USA) was used in all experiments and to prepare all buffers.

Instrumentation: The UV-Vis absorption spectra were recorded using a JASCO V-550 UV/Visible spectrophotometer (Varian Inc., Palo Alto, CA). A JASCO FP-6500 spectrofluorometer (JASCO International Co., LTD., Tokyo, Japan) was used to measure the Resonance Rayleigh Scattering and ThT fluorescence spectra. The TEM images of the colloidal gold were acquired on a JEOL JEM-1011 transmission electron microscope.

Preparation of AuNPs: AuNPs (~13 nm in diameter) were synthesized by means of sodium citrate reduction of $HAuCl_4$ following a procedure reported previously.[1,2] Briefly, 50 mL of 1 mM $HAuCl_4$ aqueous solution was brought to a reflux while stirring. 5 mL of 38.8 mM sodium citrate was added rapidly, and the solution was refluxed for an additional 15 min while stirring vigorously. The color changed from pale yellow to deep red, and the solution was allowed to cool to room temperature for use. The concentration of AuNPs solutions were determined using the absorbance values at 520 nm with the extinction coefficient of 2.7×10^8 M^{-1} cm^{-1}. To prevent the destabilization of colloidal particles by ionic species of the buffer solutions AuNPs were dissolved in a buffer with low salt concentration (1mM PBS, pH 5.0).

Sample preparation: Aβ (12-28) was purchased from Sigma (lot no. 32K12201). Peptides were prepared as previously described.[3,4,5] Briefly, the powered Aβ peptide was first dissolved in HFIP at a concentration of 1mg/ml. The solution was shaking at 4 ^{o}C for 2 hours in a sealed vial for further dissolution and was then stored at -20 ^{o}C as a stock solution. Before use, the solvent HFIP was removed by evaporation under a gentle stream of nitrogen and peptide was dissolved in distilled, deionized water. Aβ (12-28) was incubated at room temperature (RT) for 30 min in PBS buffer (1mM, pH 5.0) to form aggregates.

To screen Aβ inhibitors, 100 μM Aβ (12-28) solutions in the presence of 50 μM ligands were preincubated at RT for 30 min in PBS buffer (1mM, pH 5.0), diluted to a concentration of 0.5 μM and then added to 1.5nM AuNPs. As controls, the mixture of aged Aβ (12-28) and the ligands were added to the solution of AuNPs.

Transmission Electron Microscopy: TEM images of Aβ-AuNPs were obtained on a JEOL JEM-1011 transmission electron microscope.[5] Samples were prepared by pipetting 5 μL of colloid solution onto a carbon-coated copper grid (300 mesh; Ted Pella, Redding, Ca, USA). After evaporating the solvent, the grid was dried overnight under vacuum.[5]

***Light Scattering Study*:** In light scattering experiment,[3] a solution of AuNPs (1.5 nM) was added to a dry 1.5 mL test tube. A series of Aβ(12-28) samples (0.5μM) with or without different ligands (0.25μM) were incubated at room temperature (RT) for 30 min and added to the test tubes using microsyringes. The solution was then incubated for 10 min, and light scattering spectra[3] were measured by using a JASCO FP-6500 spectrofluorometer.

[1] C. Chen, C. Zhao, X. Yang, J. Ren, X. Qu, *Adv. Mater.* **2009**, *22*, 389.
[2] C. Chen, G. Song, J. Ren, X. Qu, *Chem. Commun. (Camb)* **2008**, 6149.
[3] H. Yu, J. Ren, X. Qu, *Biophys. J.* **2007**, 92, 185.
[4] H. Yu, J. Ren, X. Qu, *Chembiochem* **2008**, *9*, 879.
[5] J. Geng, H. Yu, J. Ren, X.Qu, *Electrochem. Commun.* **2008**, 10 1797.

Supporting Figures

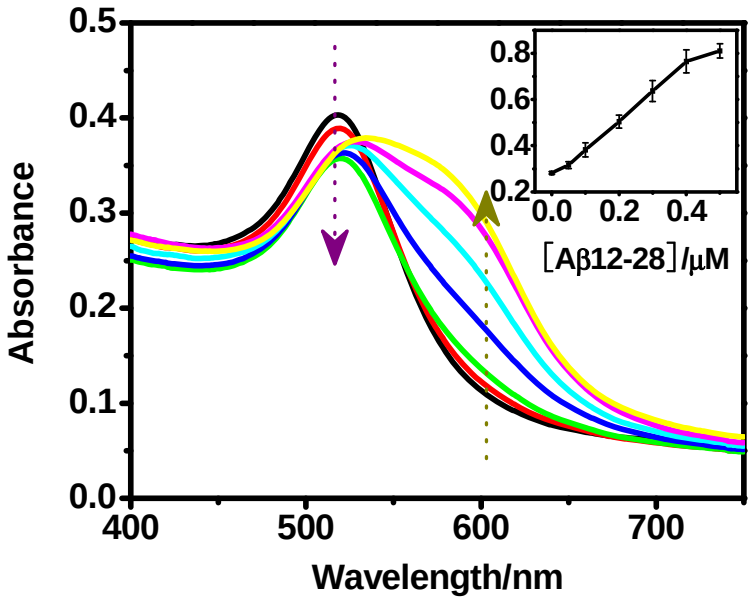

Fig. S1 Aβ(12-28) dose-dependent UV-Vis absorption of AuNPs in PBS buffer (1mM, pH=5.0). Inset: Plots of the absorption ratio (A_{600nm}/A_{520nm}) *versus* the concentrations of Aβ(12-28). Final Aβ(12-28) concentrations are 0.05 μM, 0.1 μM, 0.2 μM, 0.3 μM, 0.4 μM and 0.5 μM respectively. Concentration of AuNPs is 1.5 nM in all the AuNPs containing solutions.

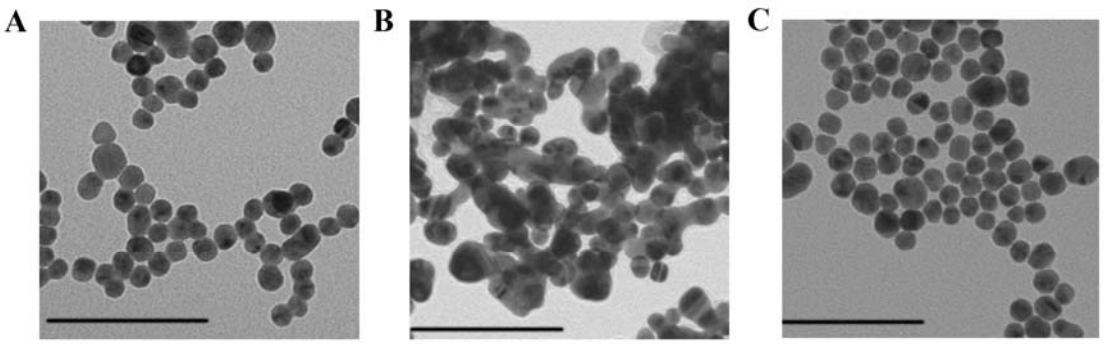

Fig. S2 TEM images showing that Rif could inhibit Aβ12-28-induced AuNPs aggregation （scale bars＝100nm）. A: AuNPs; B: AuNPs+Aβ12-28; C: AuNP+Aβ12-28+Rif.

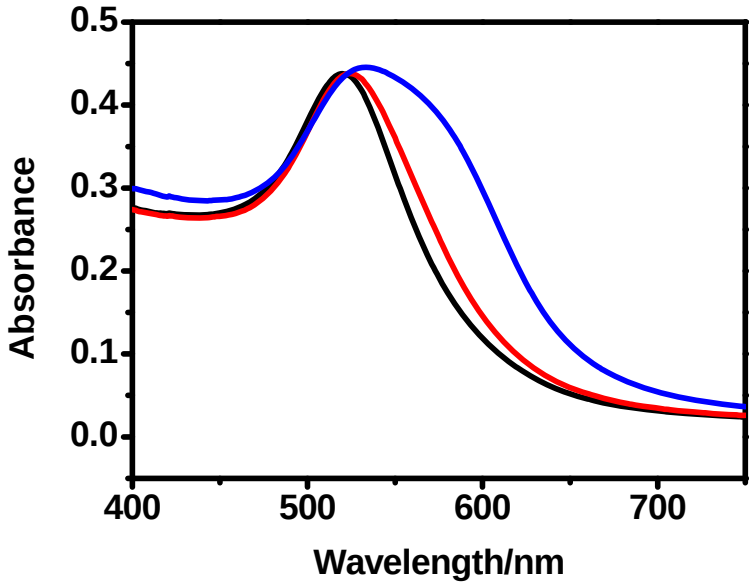

Fig. S3 Conformation-dependent Aβ12-28-induced AuNPs aggregation in PBS buffer (1mM, pH=5.0). Absorbance of AuNPs in the absence (black) or presence of Aβ12-28 (red) incubated at 4℃ or RT (blue). Final Aβ12-28 and AuNPs concentrations are 0.5μM and 1.5nM respectively.

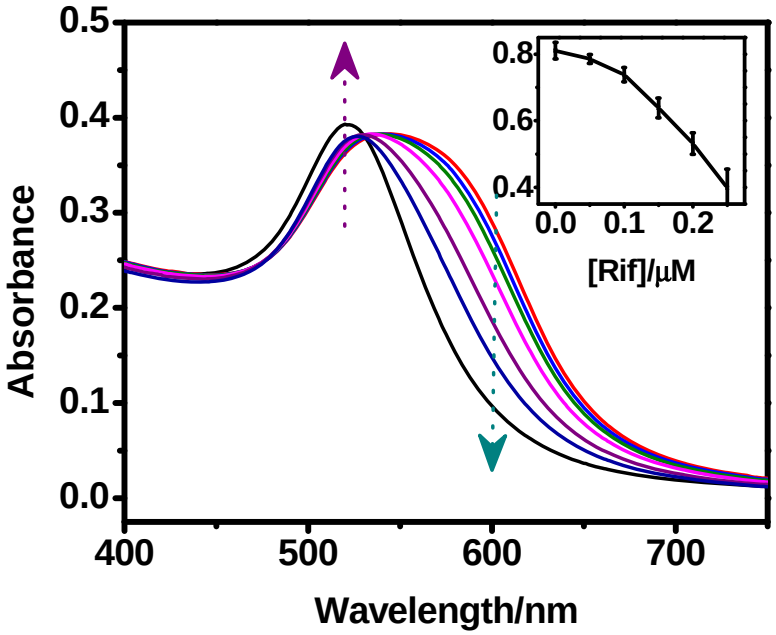

Fig. S4 Dose-dependent inhibition of Aβ12-28-induced AuNPs aggregation by Rif in PBS buffer (1mM, pH=5.0). Inset: Plots of the absorption ratio (A_{600nm}/A_{520nm}) as a function of the concentrations of Rif. Final Aβ12-28 and AuNPs concentrations are 0.5μM and 1.5nM respectively.

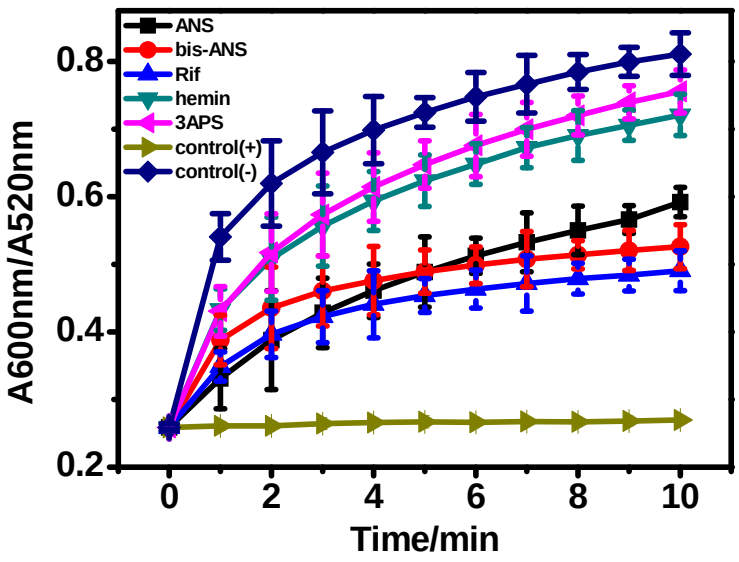

Fig. S5. Plots of the absorption ratio (A_{600nm}/A_{520nm}) of AuNPs in the absence or presence of Aβ(12-28)-ligand mixture in PBS buffer (1mM, pH 5.0) as incubation time increases. Control(+),AuNPs alone; Control (-), Aβ12-28/AuNPs. Final concentrations of Aβ(12-28), ligands and AuNPs are 0.5 μM, 0.25μM and 1.5 nM, respectively.

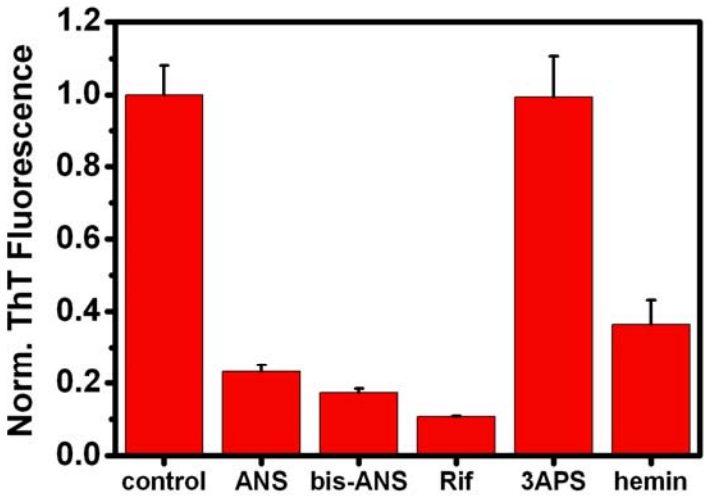

Fig. S6 Amyloid formation inhibition screened by the classical ThT assay. The fluorescence signal (excitation at 444 nm) was recorded at 480 nm. Peptide concentration was 1μM, while ThT concentration was 10μM.

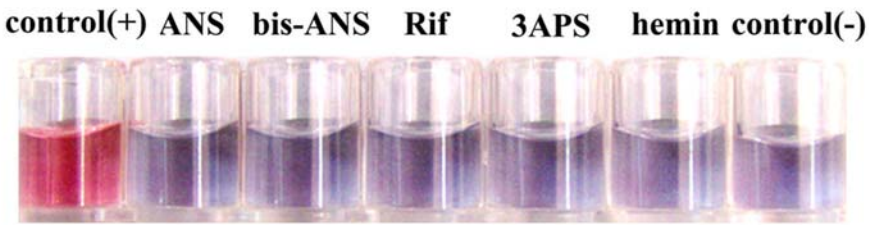

Fig. S7 Colorimetric response of AuNPs and ligands mixed solution in the presence of Aβ12-28 aggregates, respectively. Control(+), AuNPs alone; Control (-), Aβ12-28/AuNPs.

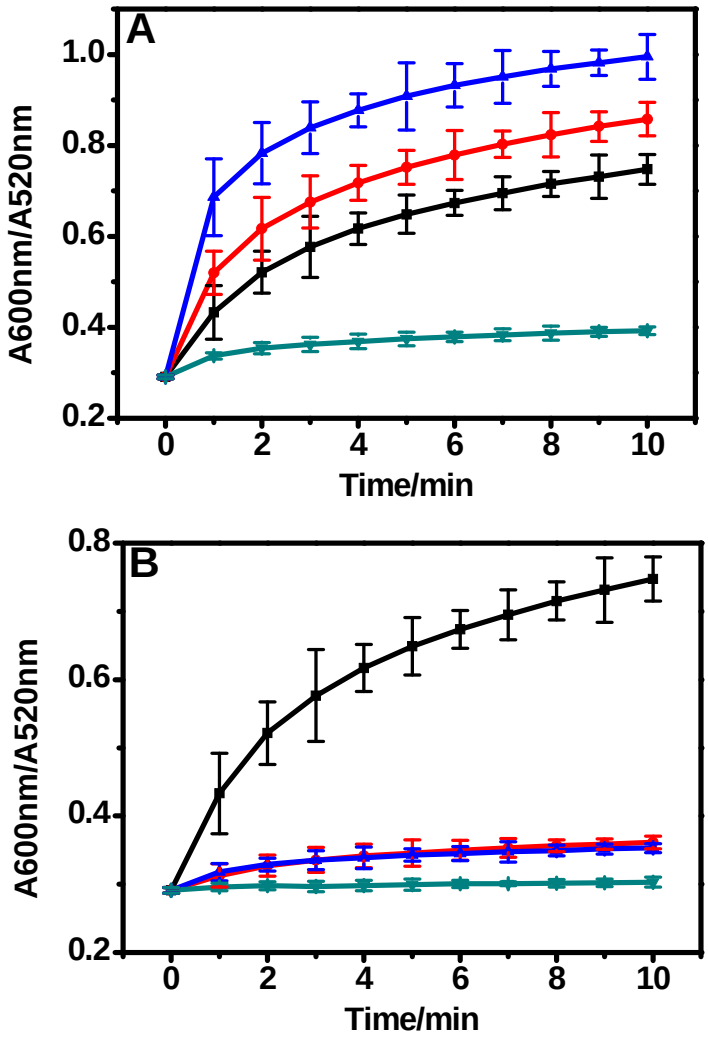

Fig. S8. A: Plots of the absorption ratio (A_{600nm}/A_{520nm}) of AuNPs+Aβ(12-28) aggregates (black), AuNPs+(DOX+ Aβ(12-28)) (red), AuNPs+DOX+Aβ(12-28) aggregates (blue) and AuNPs+DOX (dark cyan) in PBS buffer (1mM, pH 5.0) as incubation time increases. B: Plots of the absorption ratio (A_{600nm}/A_{520nm}) of AuNPs+Aβ(12-28) aggregates (black), AuNPs+(MAA+Aβ(12-28)) (red), AuNPs+MAA+Aβ(12-28) aggregates (blue) and AuNPs+MAA (dark cyan) in PBS buffer (1mM, pH 5.0) as incubation time increases. Final concentrations of Aβ(12-28), ligands and AuNPs are 0.5 μM, 0.25μM and 1.5 nM, respectively.