Supporting Information

Bio-inspired synthesis of Au nanostructures templated from amyloid β peptide assembly with enhanced catalytic activity

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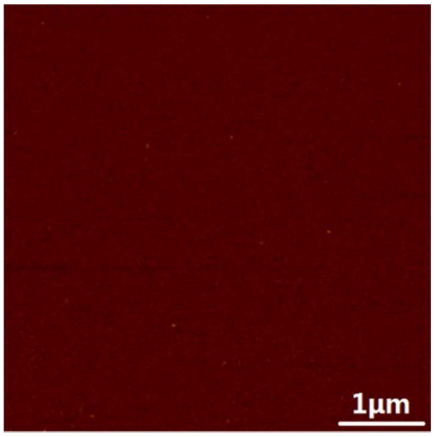


Figure S1. AFM image of P0 monomer.

FTIR analysis

For the P0 and W0 solution, the peaks at 1618 nm and 1617 nm of the FTIR spectra, respectively, could be ascribed to the disordered structure of $A\beta_{25-35}$ monomer. For the P3 and P12 solution, the peak at 1625 nm and 1628 nm of the FTIR spectra, respectively, could be ascribed to the ordered β-shift structure of $A\beta_{25-35}$ nanofibrils. The result indicated the secondary structures of the $A\beta_{25-35}$ monomer and $A\beta_{25-35}$ nanofibrils were different.

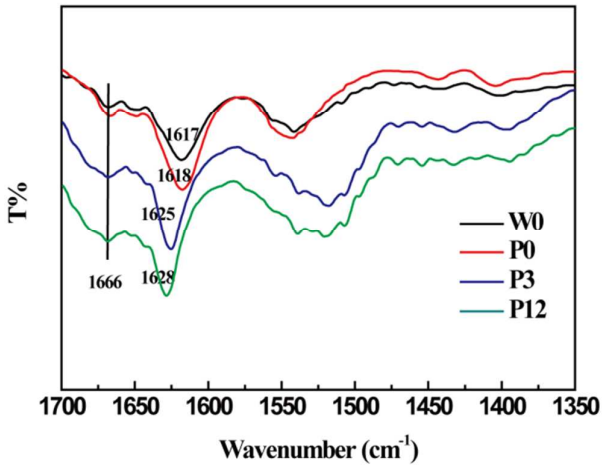


Figure S2. FTIR spectra of W0, P0, P3, and P12 solution.

XRD analysis

Five peaks in the XRD spectra of Au_{W0}, Au_{P0}, Au_{P3}, and Au_{P12} appearing at 2θ = 38.18°, 44.39°, 66.58°, 77.55°, and 81.72° were indexed as the (111), (200), (220), (311), and (222) planes of the face centered-cubic (fcc) gold (JCPDS 04-0784), respectively, indicating that metallic Au were formation after $NaBH_4$ reduction.

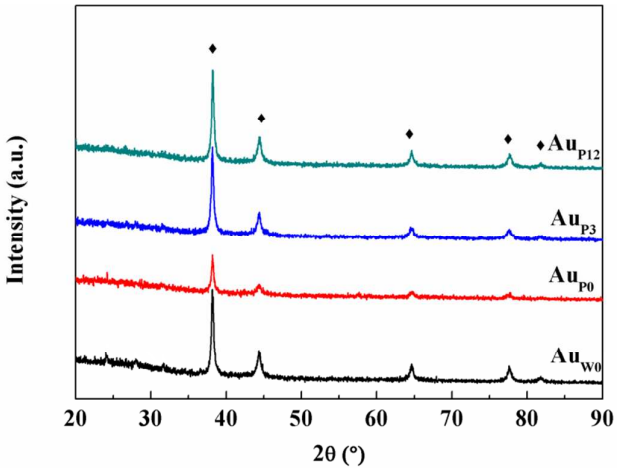


Figure S3. XRD spectra of Au_{P0}, Au_{P3}, Au_{P12}, and Au_{W0}. ♦ Au^o.

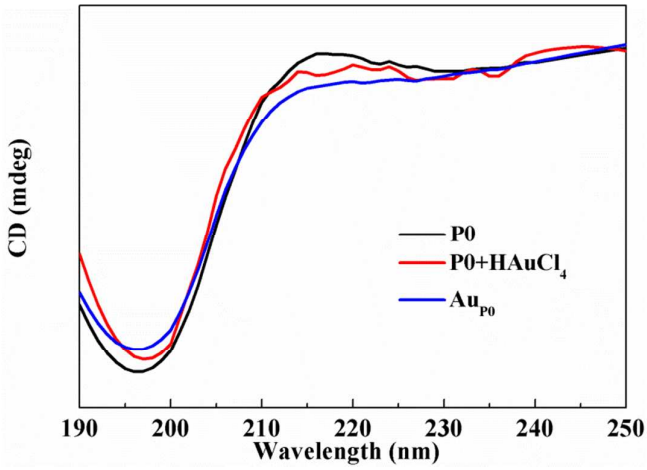
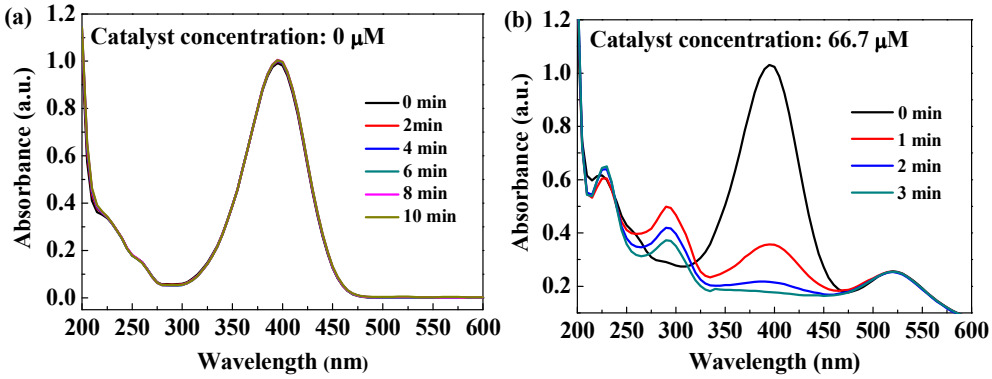


Figure S4. CD spectra of P0, P0+$HAuCl_4$, and Au_{P0} solution.

Limit of catalyst concentration

The limit of catalyst concentration for the catalytic reduction of 4-nitrophenol is shown in Figure S5. Without the addition of Au catalyst, the reduction of 4-nitrophenol could hardly proceed (Figure S5a). However, after the addition of Au, the reduction of 4-nitrophenol can proceed significantly (Figure S5b). When we lower the Au concentration from 66.7 to 2.5 μM, the conversion of 4-nitrophenol became very slow, but still proceeded with the conversion of 33.6% for 10 min (Figure S5d). Further decreasing the catalyst concentration to less than 1.67 μM, the conversion of 4-nitrophenol could hardly proceed (Figure S5e and f), meaning that the limit of the catalyst concentration was about 1.7 μM. The result indicated that the Aβ templated-Au nanostructures are highly reactive catalysts.



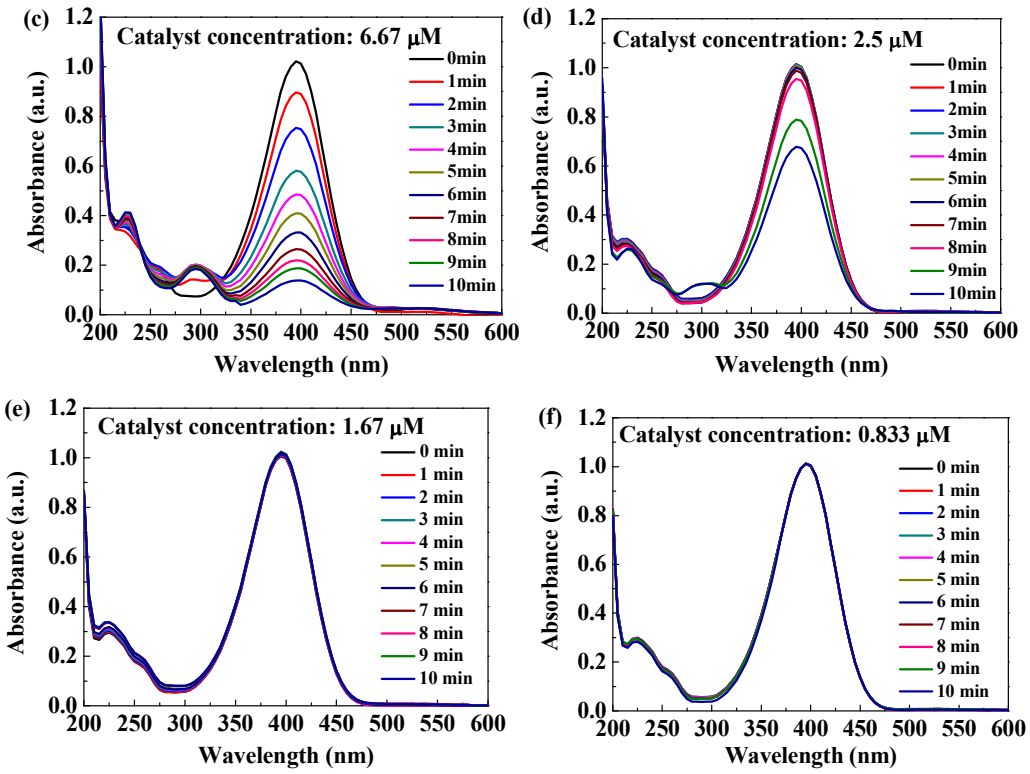
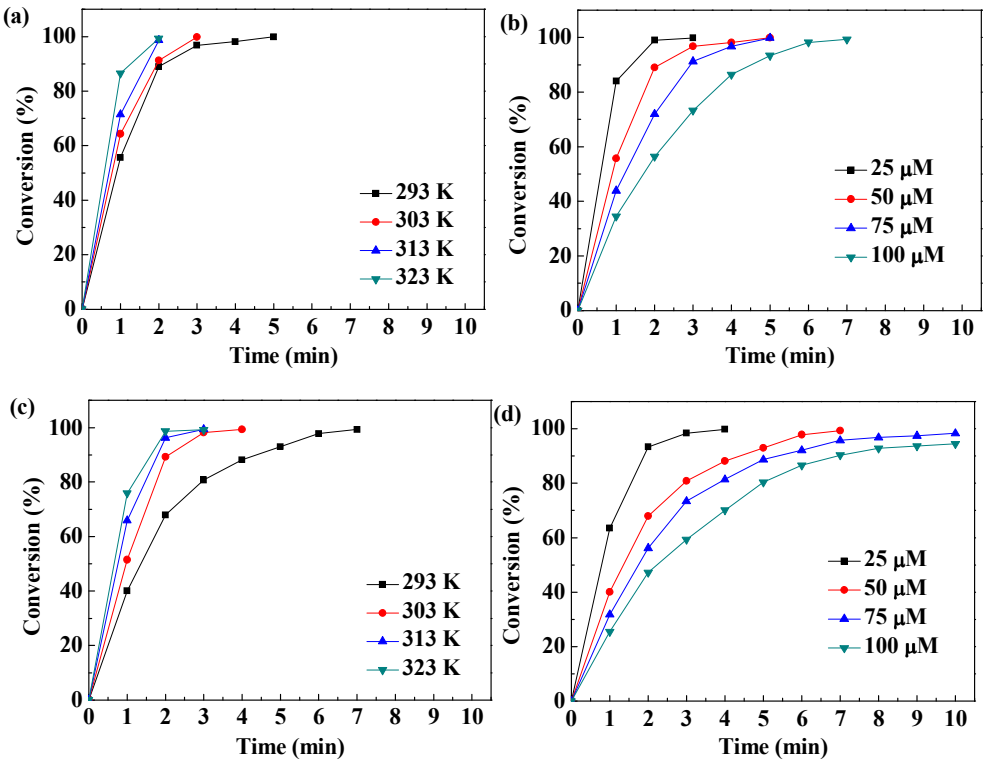


Figure S5. Absorption peak at 400 nm of 4-nitrophenol vs catalyst concentration. Reaction condition: Au_{P0} as catalyst, Au concentration, 66.7–0.833 μM; 4-nitrophenol concentration, 50 μM; reaction temperature, 293 K.



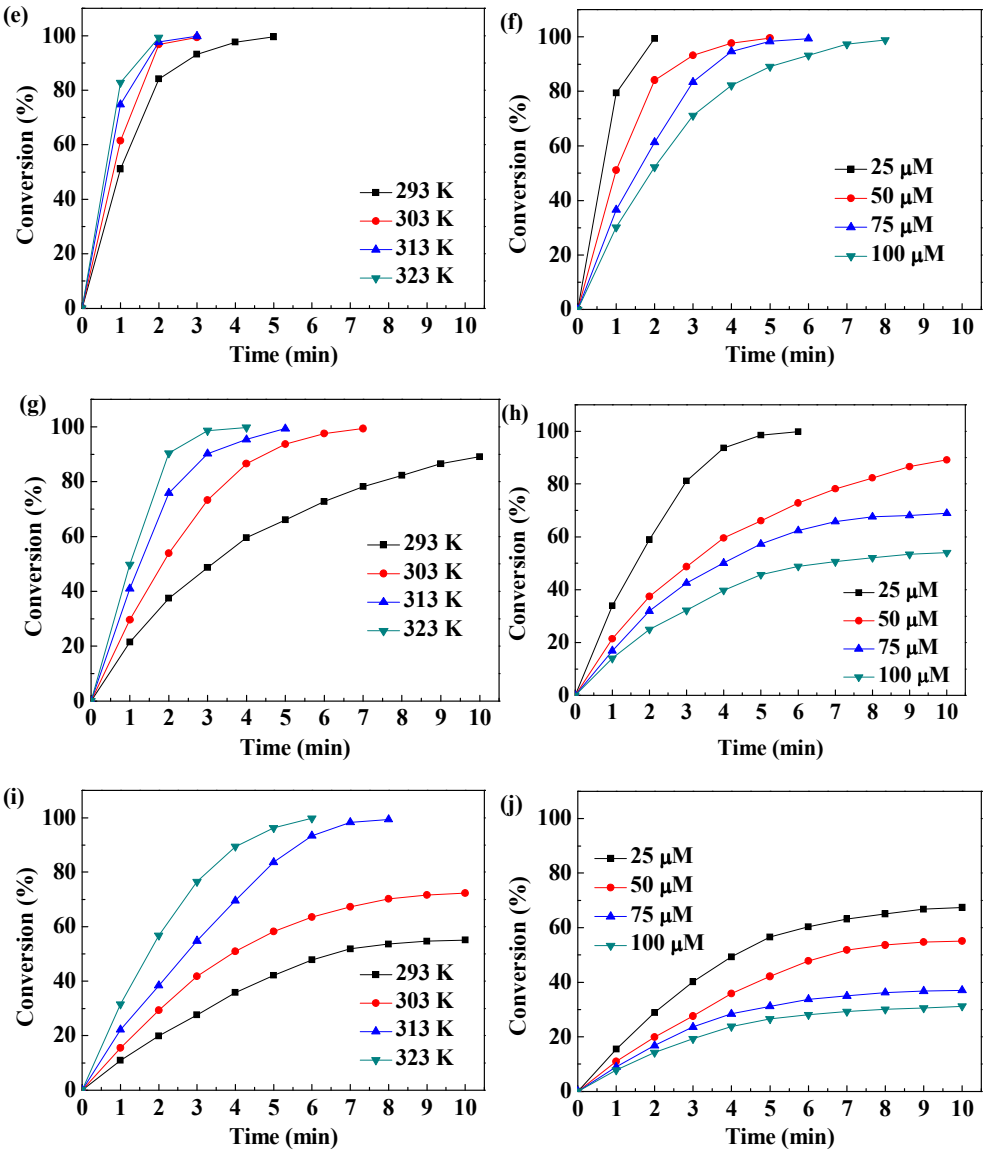


Figure S6. Effects of reaction temperature and 4-nitrophenol concentration on the conversions of 4-nitrophenol catalyzed by Au_{P0} (a, b), Au_{P3} (c, d), Au_{P12} (e, f), Au_{W0} (g, h), and Au_0 (i, j) nanostructures, respectively. Reaction conditions: (a, c, e, g, I, k, m, and o) 4-nitrophenol concentration, 50 μM; catalyst, 63.3 μM; (b, d, f, h, j, n, and p) reaction temperature, 293–323 K; reaction temperature, 293 K; catalyst, 63.3 μM; 4-nitrophenol concentration 25–100 μM.