Reduced Aggregation and Cytotoxicity of Amyloid Peptides by Graphene Oxide/Gold Nanocomposites Prepared by Pulsed Laser Ablation in Water

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Raman spectroscopy was employed to investigate the carbon structure of GO before and after decorated by Au nanoparticles. As shown in Figure S1, a small peak at $\sim 2700 \text{ cm}^{-1}$ was investigated which belongs to the 2D peak of graphene and indicating the GO was multilayer. D band at 1350 cm$^{-1}$ and G band at 1580 cm$^{-1}$ can be clearly observed which are usually assigned to the local defects/disorders and the sp$^2$ graphitized structure. After Au nanoparticles deposited on GO sheets, the $I_D/I_G$ ratio didn’t increased, indicating GO was still with a good oxidized state and didn’t reduced into rGO in our GO/AuNP nanocomposites produced by PLA method.
Figure S2. Peak deconvolution of C1s XPS spectrum of GO/AuNP nanocomposites.

Figure S3 ThT fluorescence signals of Aβ(1-42) in absence and presence of AuNPs and GO/AuNPs at the same concentration (5 mg L⁻¹).
Figure S4 AFM images of Aβ(1-42) fibrils in absence (A) and in presence of different concentrations of GO/AuNPs: (B) 5 mg L⁻¹; (C) 10 mg L⁻¹; (D) 20 mg L⁻¹.

Figure S5 AFM image of Aβ(1-42) adsorbed on a GO/Au nanocomposite sheet.
Figure S6 Tyrosine fluorescence signal of Aβ(1-42) was quenched in the presence of different concentrations of GO and GO/AuNPs.

Figure S7 ANS fluorescence data for Aβ(1-42) alone and in the presence of different concentrations of GO or GO/AuNPs.
Figure S8. Confocal fluorescence microscopy images of comet assay in DNA damage of SH-SY5Y cells without any treatment (A), cultured with GO/Au nanocomposites of 5 mg L$^{-1}$ (B) and 40 mg L$^{-1}$ (C), respectively.

Based on the comet assay, the DNA of SH-SY5Y cells without any stimulus was condensed and without a tail of DNA fragmentation. Meanwhile, after SH-SY5Y cells cultured with 5 mg L$^{-1}$ or 40 mg L$^{-1}$ GO/Au nanocomposites, still no DNA tails could be observed. It indicated that GO/AuNPs exhibited little DNA damages to SH-SY5Y cells at those concentrations.
Figure S9. Depolymerization of Aβ(1-42) fibrils induced by GO/AuNPs detected by ThT assay.