

## **Electronic Supplementary Information (ESI)**

### **Dual-functional Selenium Nanoparticles Bind to and Inhibit Amyloid $\beta$ Fibers Formation in Alzheimer's Disease**

Licong Yang<sup>a</sup>, Jing Sun<sup>a</sup>, Wenjie Xie<sup>a</sup>, Yanan Liu<sup>a</sup> and Jie Liu<sup>a\*</sup>

a: Department of Chemistry, Jinan University, Guangzhou 510632, P. R. China;

Tel.: +86 20 85220223; fax: +86 20 85220223; \*E-mail: tliuliu@jnu.edu.cn

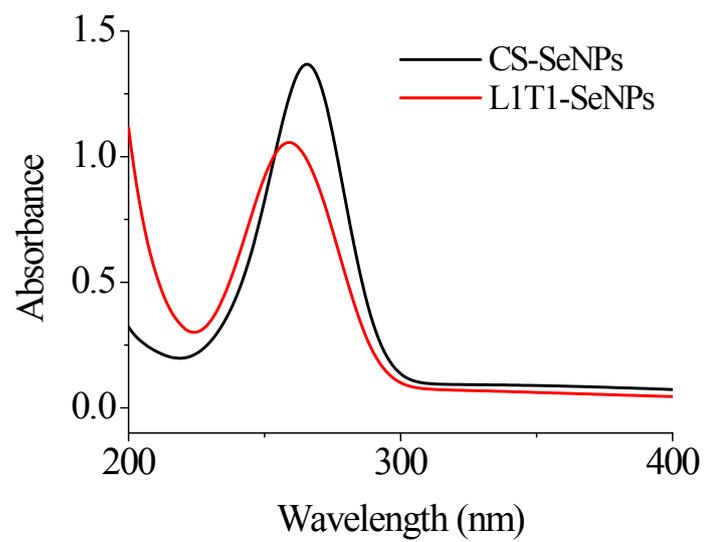


Fig. S1. UV-vis spectra of CS-SeNPs and L1T1-SeNPs.

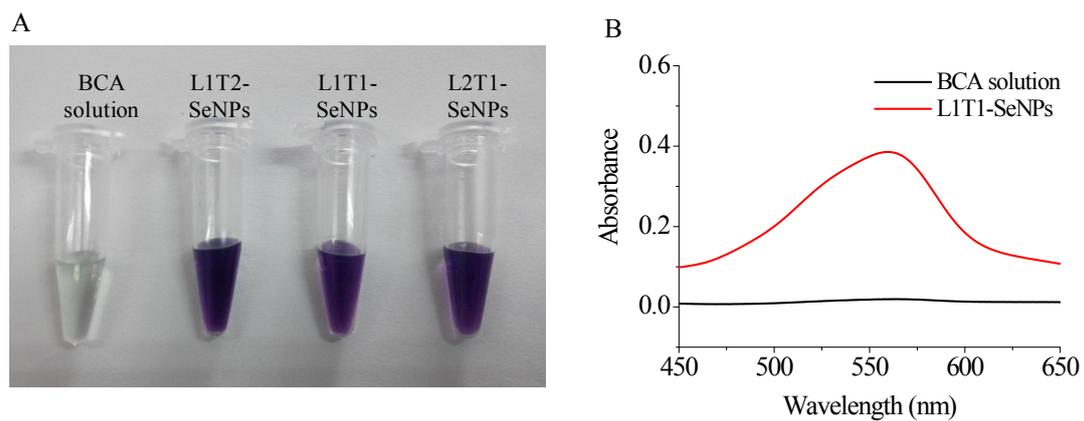


Fig. S2. Conjugation of LPFFD and TGN peptides to SeNPs were examined by BCA assay (A). The changes in the color of BCA solution after reaction with L1T1-SeNPs (B). UV- vis spectra showing an increase in the absorbance at 560 nm for L1T1-SeNPs due to the presence of LPFFD and TGN peptides.

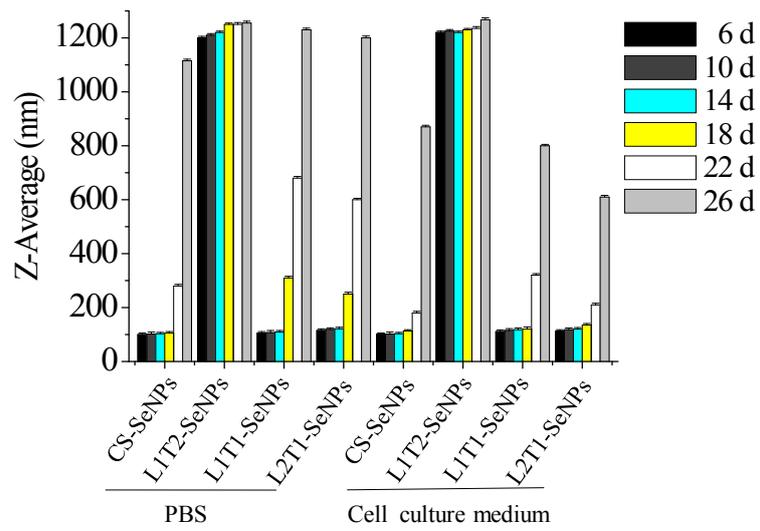


Fig. S3. The stability of CS-SeNPs, L1T2-SeNPs, L1T1-SeNPs and L2T1-SeNPs in PBS (pH = 7.4) and cell culture medium from 6 to 26 days.

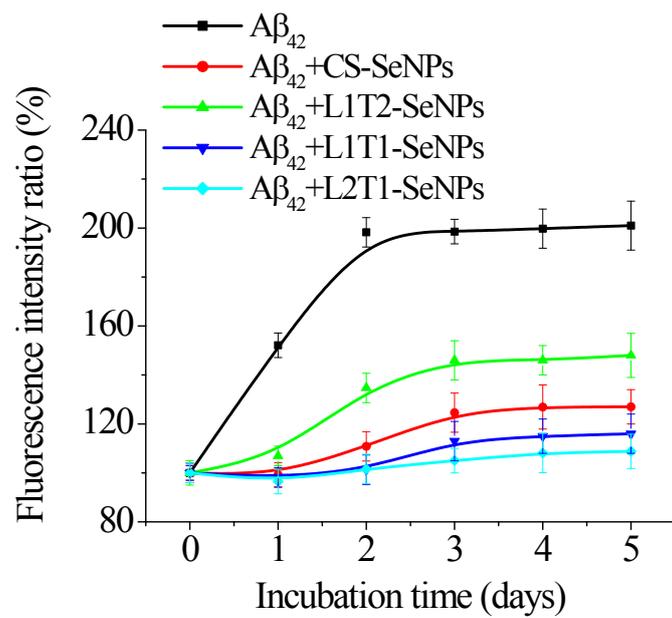


Fig. S4. Inhibition of Aβ<sub>42</sub> fibrillation by CS-SeNPs, L1T2-SeNPs, L1T1-SeNPs and L2T1-SeNPs. Aβ<sub>42</sub>=30 μM, nanoparticles=60 μg/mL.

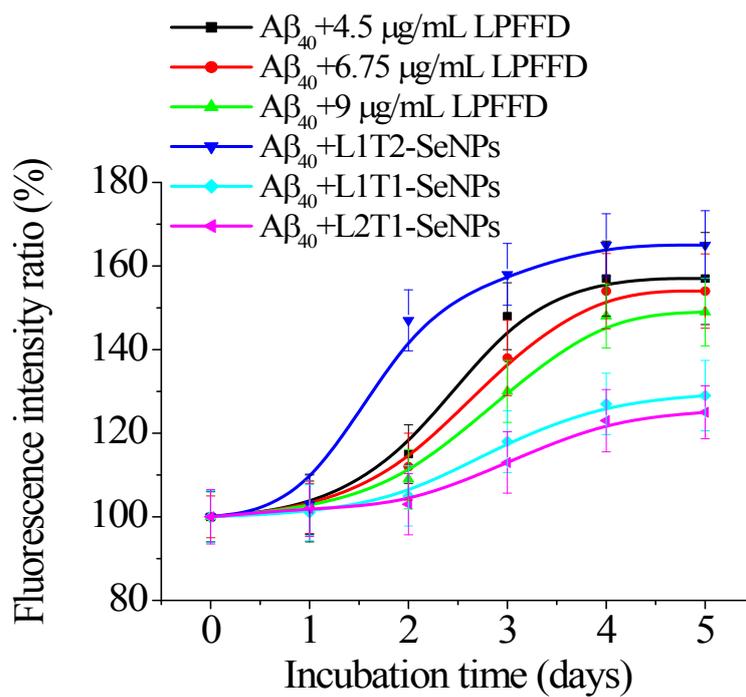


Fig. S5. Inhibition of Aβ<sub>40</sub> fibrillation by CS-SeNPs, LPFFD, L1T2-SeNPs, L1T1-SeNPs and L2T1-SeNPs. Aβ<sub>40</sub>=30 μM, nanoparticles=60 μg/mL. The concentration of LPFFD peptides were calculated according to the same concentration of LPFFD on dual-fuctional SeNPs.

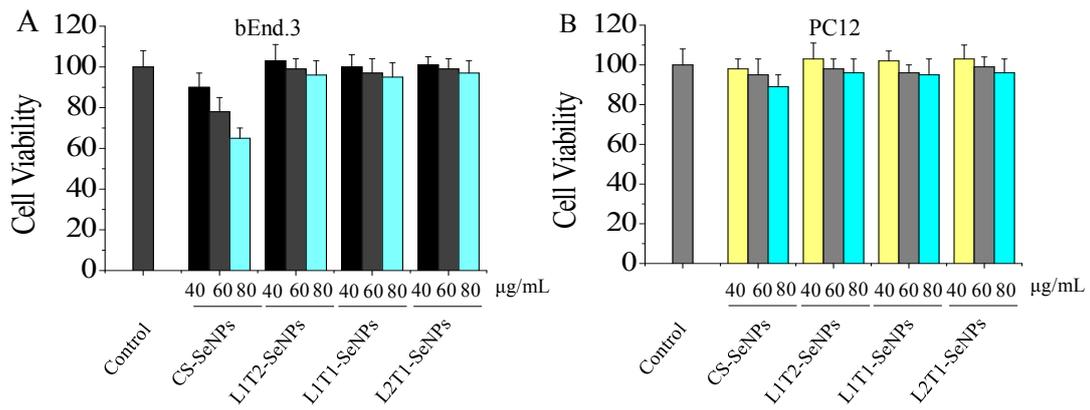


Fig. S6. The cell cytotoxicity of nanoparticles in bEnd.3 and PC12 cells.

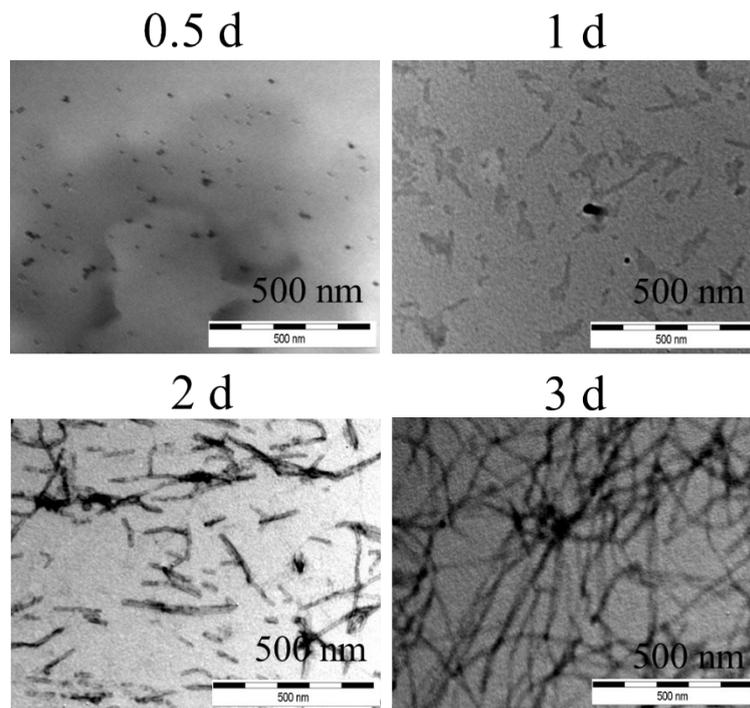


Fig. S7. TEM images of Aβ<sub>40</sub> after incubation for 0.5, 1, 2 and 3 d. Aβ<sub>40</sub>=30 μM.

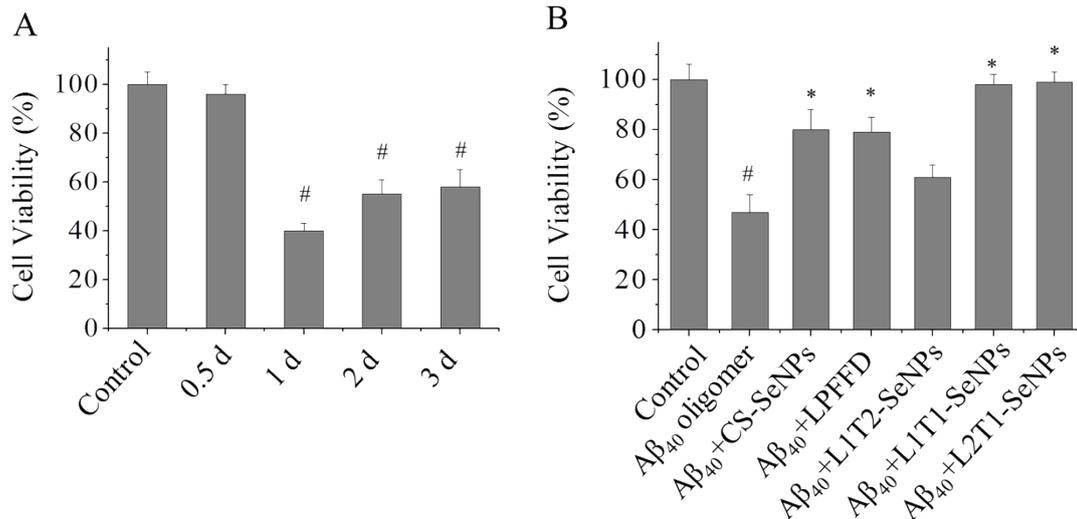


Fig. S8. The neurotoxicity of A $\beta$ <sub>40</sub>. A, The toxic of A $\beta$ <sub>40</sub> incubated in different times were tested by an MTT assay. The toxic oligomers present in 1 d incubation. B, in the absence or presence of nanoparticles or LPFFD toward PC12 cells tested by an MTT assay after incubation for 1 d. A $\beta$ <sub>40</sub>=30  $\mu$ M, nanoparticles=60  $\mu$ g/mL. The concentration of LPFFD was calculated according to the same concentration of LPFFD on L2T1-SeNPs. \*, P<0.05 versus A $\beta$ <sub>40</sub> oligomer; #, P<0.05 versus control.

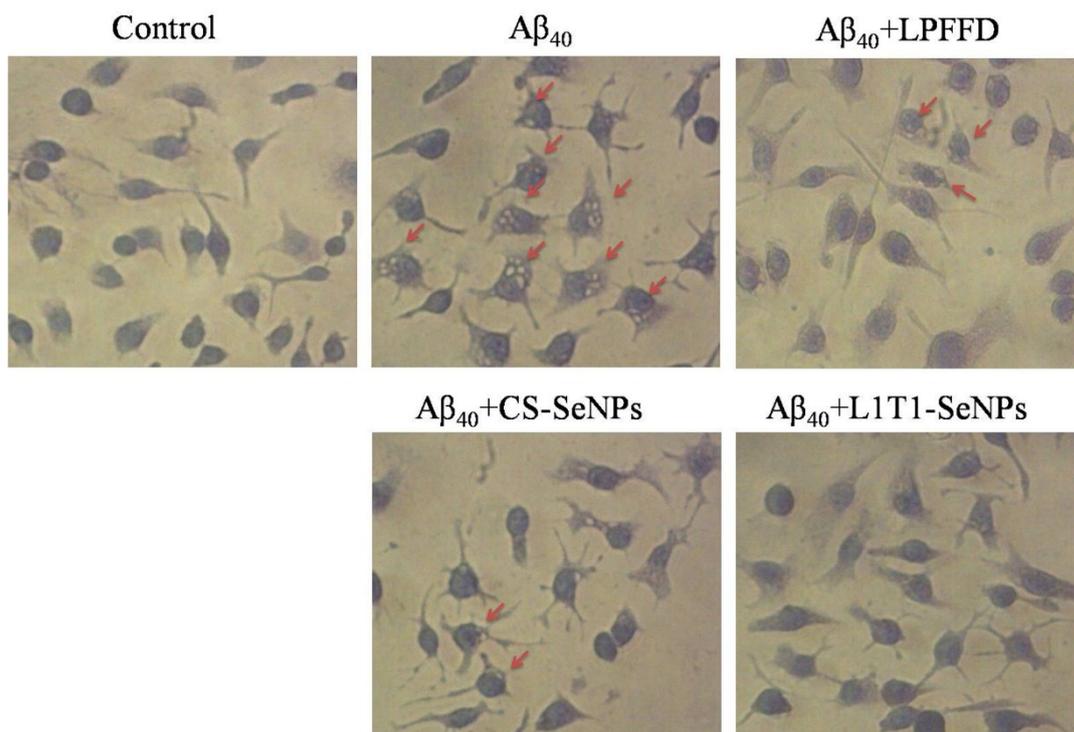


Fig. S9. Morphology of PC12 cells in the presence of Aβ<sub>40</sub> and nanoparticles. PC12 cells were treated Aβ<sub>40</sub> and nanoparticles/LPFFD for 48 h. Then fixed and stained with hematoxylin and eosin for cell morphological evaluation (red arrows, autophagic vacuoles). The concentration of LPFFD was calculated according to the same concentration of LPFFD on L2T1-SeNPs.

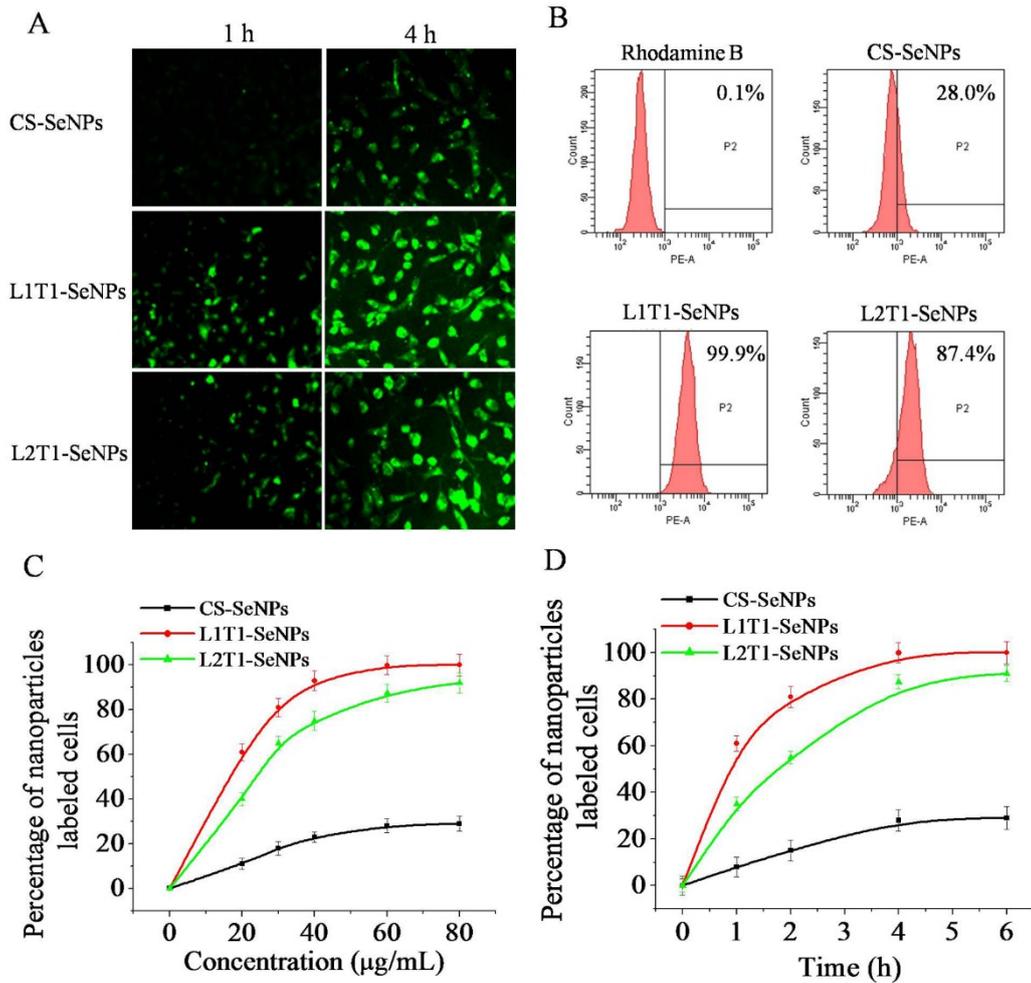


Fig. S10. bEnd.3 cells uptake of Rhodamine B labeled CS-SeNPs, L1T1-SeNPs and L2T1-SeNPs in vitro. Images were captured using fluroscent microscope (magnification 200×) (A). The bEnd.3 cells treated with Rhodamine B labeled CS-SeNPs, L1T1-SeNPs and L2T1-SeNPs for 4 h. Flow cytometry was used to analysis of the percentage of SeNPs-labeled bEnd.3 cells (B). The effect of nanoparticle concentration (C) and incubation time (D) and on the bEnd.3 cells uptake of Rhodamine B labeled CS-SeNPs, L1T1-SeNPs and L2T1-SeNPs.