Highly sensitive quantification of Alzheimer's Disease biomarkers by aptamer-assisted amplification

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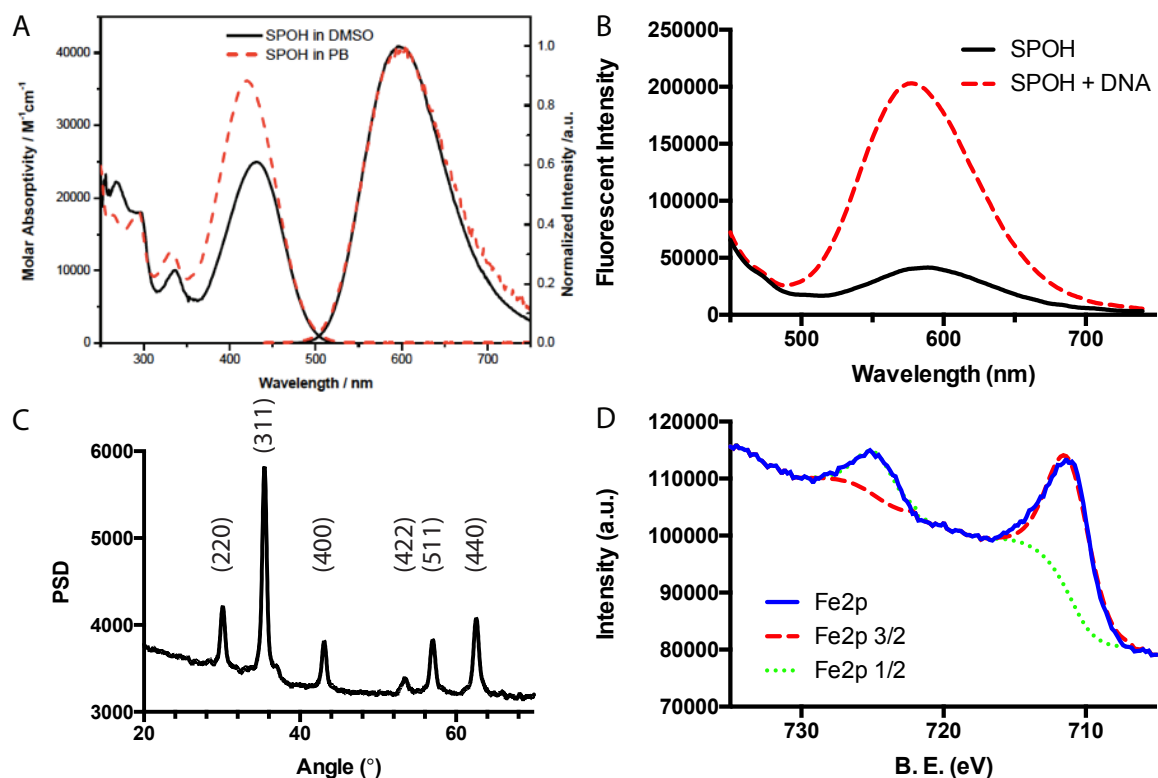
Figure S 1. (A) UV-Vis absorption and emission spectra of SPOH. (B) The fluorescence response of SPOH in the absence or presence of DNA in TNE buffer. (C) XRD spectra of iron oxide nanoparticles. (D) XPS spectra of iron oxide nanoparticles
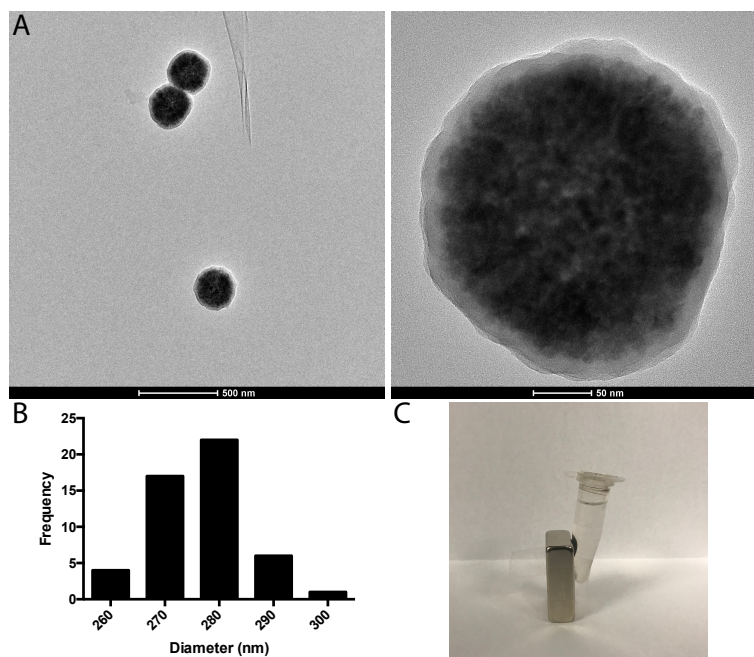

Figure S 2. (A) TEM images of the silica coated-iron oxide nanoparticles. (B) Size distribution of the silica coated-iron oxide nanoparticle, n=50. (C) Images of the silica coated-iron oxide nanoparticles in the presence of a magnetic bar.
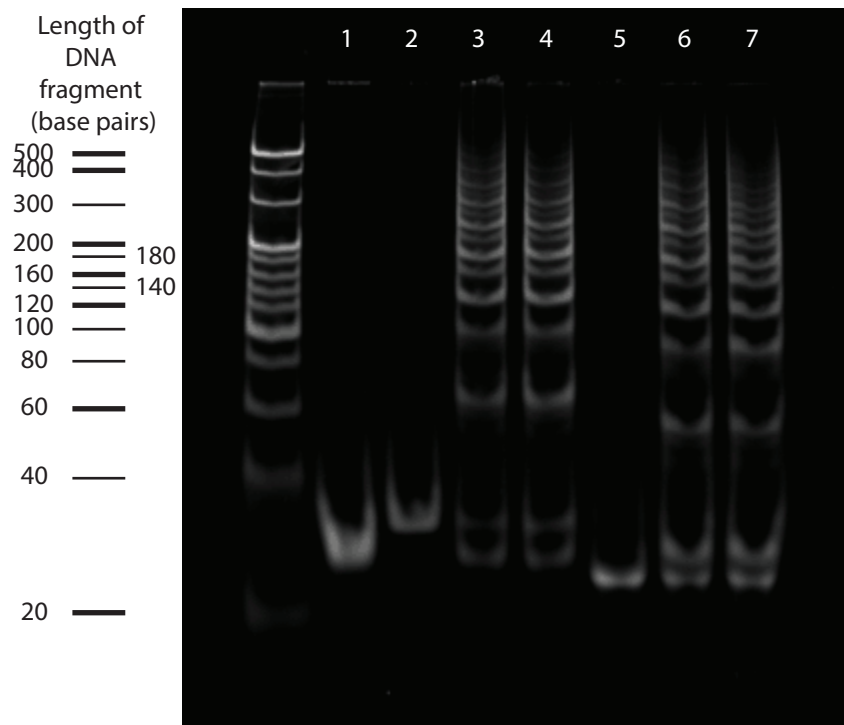
Figure S 3. Gel electrophoresis of mixtures of am1 and am2 (Lane 1), Aβ P (Lane 2), mixtures of Aβ P, am1 and am2 with the absent (Lane 3) and present (Lane 4) of Aβ42, tau P (Lane 5) and mixtures of tau P, am1 and am2 with the absent (Lane 6) and present (Lane 7) of tau441.
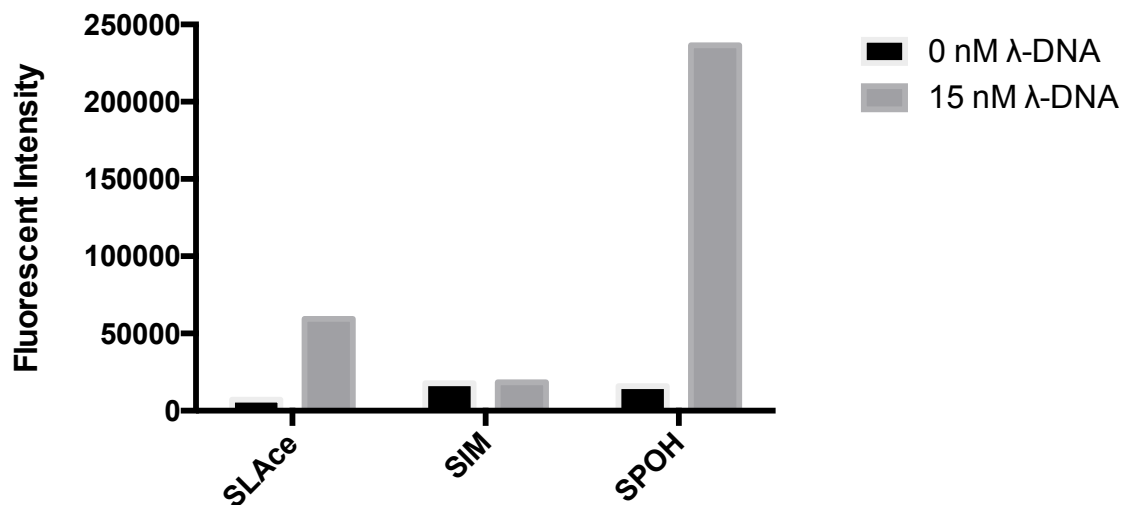

Figure S 4. The fluorescence response of SLAce, SIM and SPOH in the absence or presence of λ-DNA in TNE buffer.
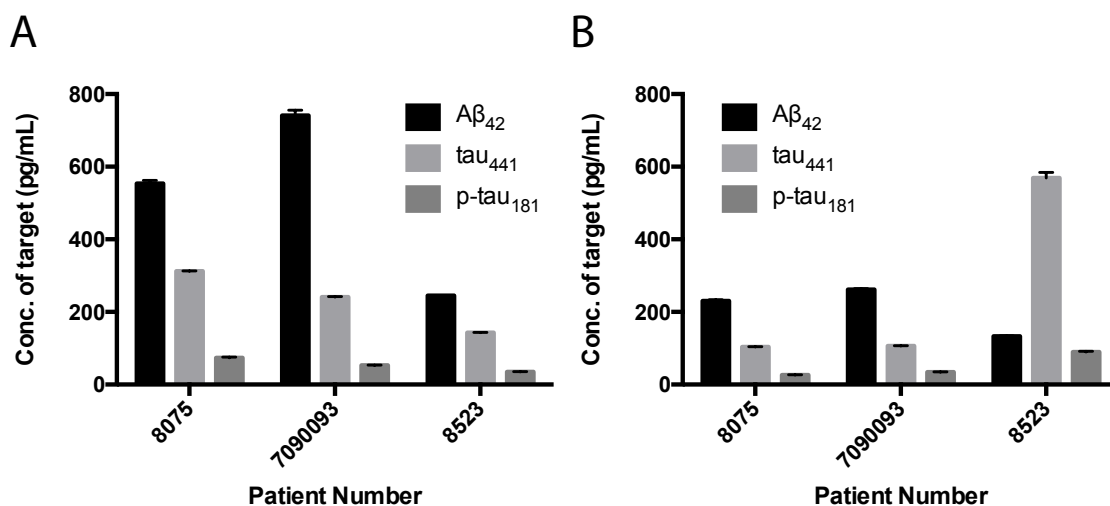
Figure S 5. The profile of AD biomarkers Aβ42, tau441 and p-tau181 in (A) human CSF and (B) serum samples from AD patient (# 8075) and healthy donors (# 7090093 and 8523). Error bars, standard error of mean n=3. (Average net intensity = (1 × 1 square pixel of 50 individual MNCs) – (1 × 1 square pixel of 50 individual background area on the image) / 50).

Assay type	Limit of detection	Detection range	Cost (USD)	First author
Microarray	$A\beta_{42}$: 73 pg/mL	0.1-100 ng/mL		Gagni et al. (2013) [3]
Electrochemical	$A\beta_{42}$: 5 pM	0.2-1.5 nM		Liu et al. (2013) [6]
Electrochemical	Aβ: 1 pg/mL	1 pg/mL – 1 ng/mL		Oh et al. (2013) [7]
Electrochemical	$A\beta_{42}$: 100 pg/mL	0.5-500 ng/mL		Rama et al. (2014) [8]
Chip-based SPR	$A\beta_{42}$: 500 pg/mL	100-2000 pg/mL		Lee et al. (2014) [9]
Electrochemical	Aβ: 28 pM	0.1-2 ng/mL		Yu et al. (2015) [10]
SERS	Aβ: 312 pg/mL Tau: 150 pg/mL	0-6 pg/mL		Demeritte et al. (2015) [11]
Electrochemical	Aβ: 700 pg/mL			Vestergaard et al. (2005) [12]
Chip-based optical	$A\beta_{42}$: 7.8 pg/mL t-tau: 15.6 pg/mL	62.5-500 pg/mL		Song et al. (2018) [22]
Fluorescent (Antibody-Antibody system)	$A\beta_{42}$: 23 fM Tau_{441}: 14 fM p-tau_{181}: 34 fM	5-1000 fM	17	Chan et al. (2017) [32]
Fluorescent (Antibody-aptamer system)	$A\beta_{42}$: 8.4 fM Tau_{441}: 4.3 fM p-tau_{181}: 3.6 fM	0.05-1000 fM	6	Newly developed method

Table S 1. Summary of the previous reported assay for Alzheimer's disease.