Electronic Supplementary Information

Conformation-Specific Perturbation of Membrane Dynamics by Structurally Distinct Oligomers of Alzheimer's Amyloid-β Peptide

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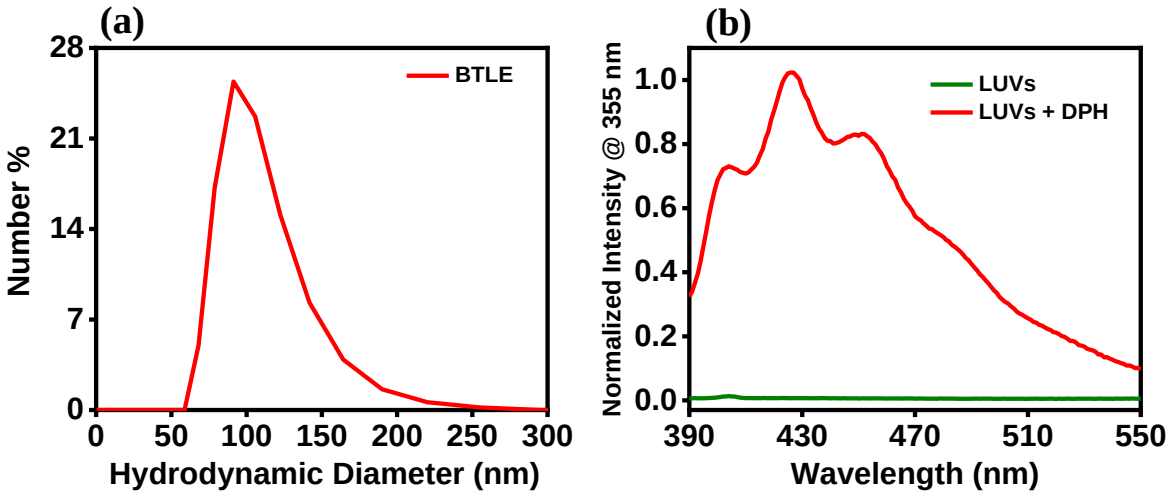

Figure S1. (a) Size distribution of lipid vesicles derived from BTLE by dynamic light scattering measurements (DLS). (b) Normalized spectra of 76 µgLUVs of BTLE with (red) and without DPH (olive)showing insignificant counts forLUVs without DPH.

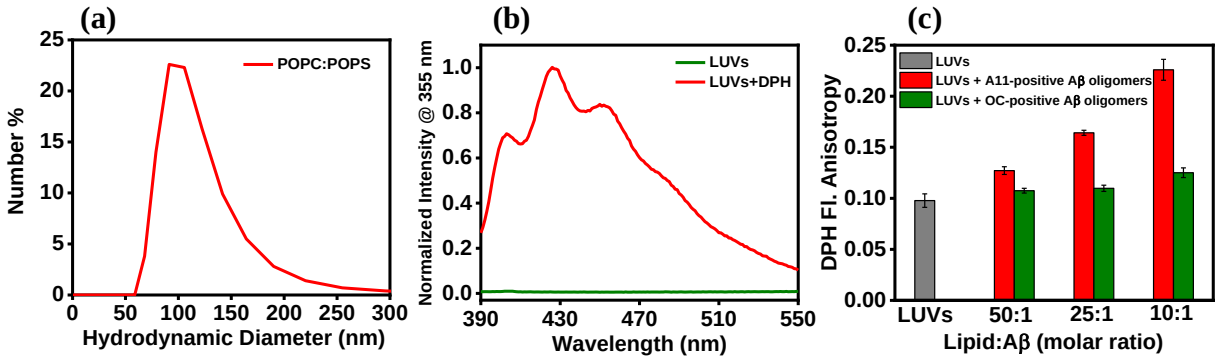

Figure S2. (a) The size distribution of lipid vesicles prepared from a mixture of phospholipids, POPC and POPS in 3:1 molar ratio by DLS. (b) Normalized spectra of 100 µM LUVs of POPC and POPS in 3:1 ratio with (red) and without DPH (olive) showing insignificant counts from LUVs without DPH. (c) Steady-state DPH fluorescence anisotropy of 100 µM LUVs of POPC and POPS in 3:1 ratio without (grey) and with A11-(red) and OC-positive Aβ oligomers (olive) at the varying ratio of lipid:Aβ (molar ratio). The bar plot shows the mean ± standard deviation (n = 3).

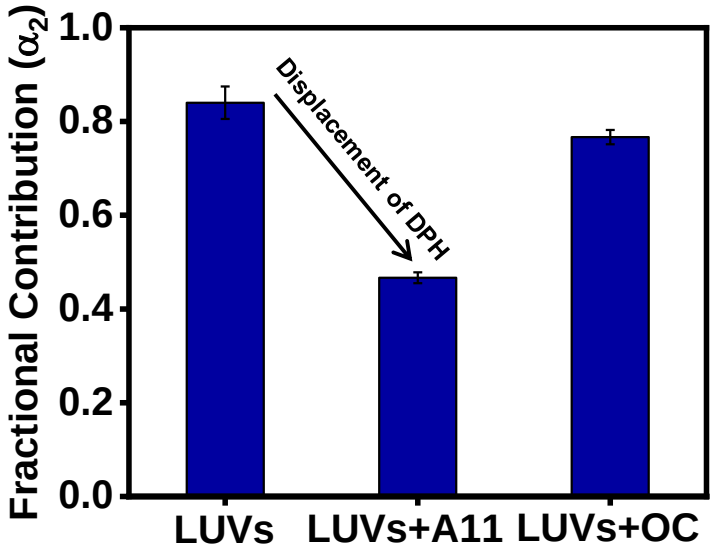

Figure S3. Fractional contribution (α_2) associated with longer lifetime component (τ_2) of DPH embedded LUVs of the mixture of pure phospholipids, POPC and POPS, in 3:1 ratio without and with Aβ oligomers at 25:1 molar ratio of lipid:Aβ. α_2 was obtained from three independent measurements and represented as mean ± standard deviation.

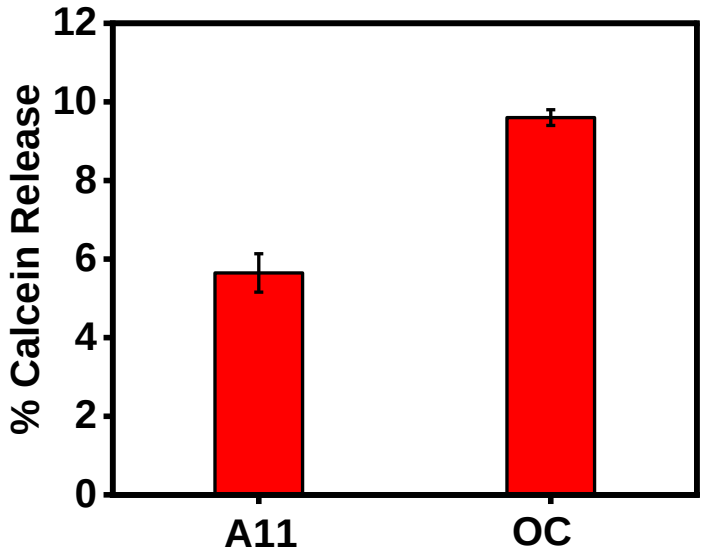

Figure S4. Calcein release efficiency of LUVs derived from BTLE upon the addition of 4 μM of A11- and OC-positive Aβ oligomers. The calcein release efficiency was calculated using equation 7 (See Methods for details).

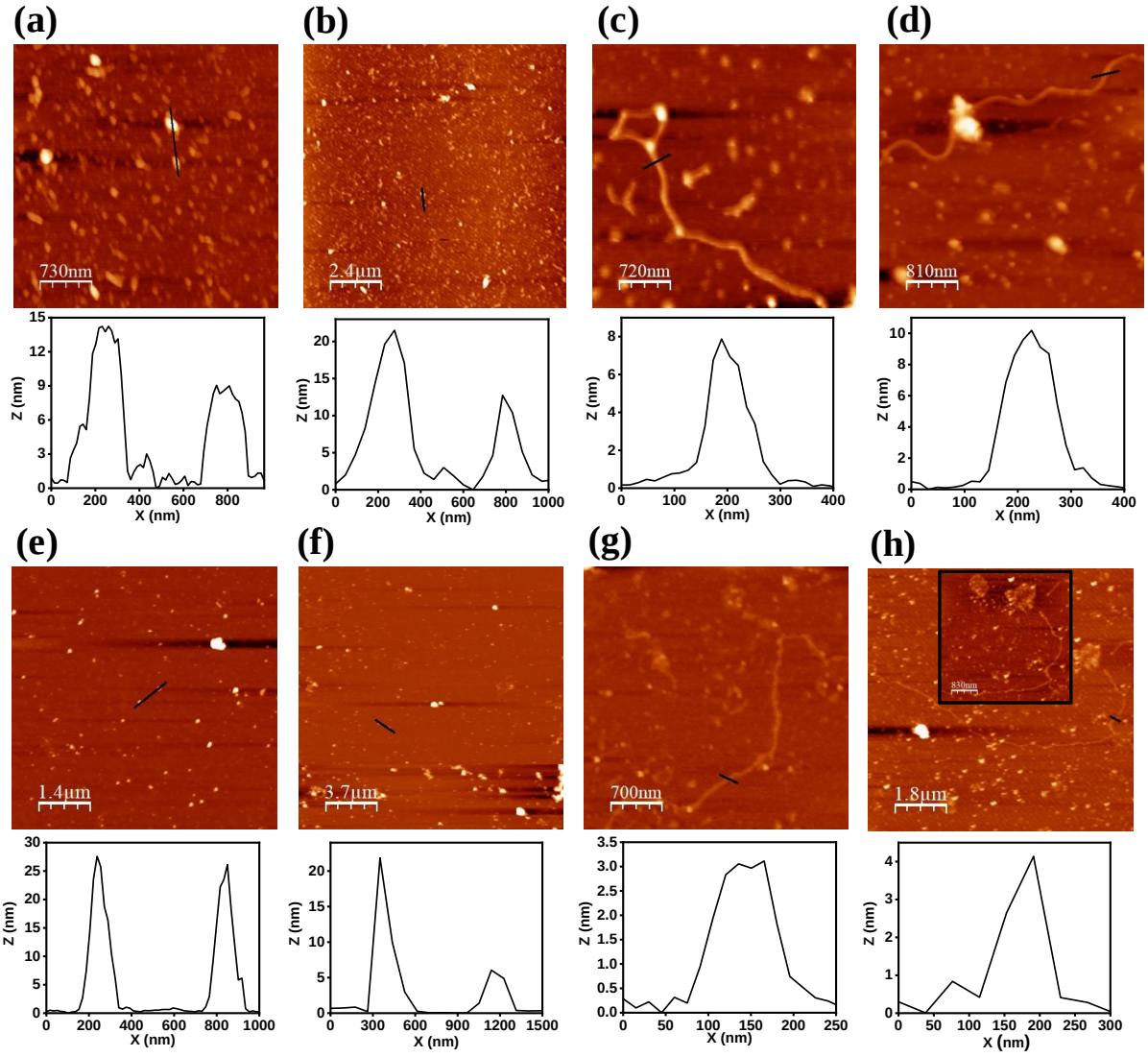

Figure S5. AFM images of Aβ oligomers without and with LUVs of BTLE with their height profiles. (a) & (b) A11-positive Aβ oligomers, (c) & (d) LUVs-bound A11-positive Aβ oligomers, (e) & (f) OC-positive Aβ oligomers and (g) & (h) LUVs-bound OC-positive Aβ oligomers. Inset in (h) shows the zoomed scan of image (h).

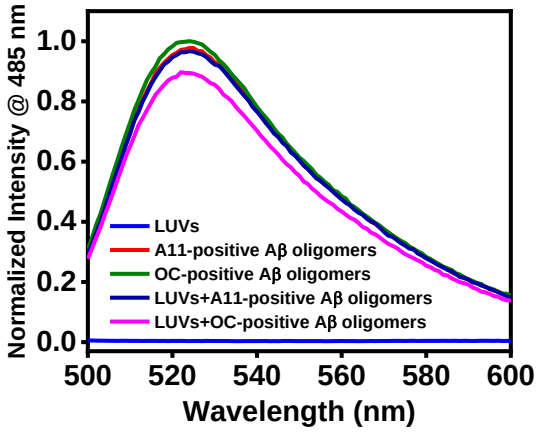

Figure S6. Spectra of N-terminal FAM-labeled Aβ oligomers without and with LUVs of BTLE at 2:1 ratio of lipid:Aβ.

Table S1. Typical parameters recovered from the time-resolved DPH fluorescence anisotropy decay of LUVs of BTLE with and without Aβ oligomers using equations 5 and 6.

Sample	**ϕ_{fast} (ns) (β_{fast})**	**ϕ_{slow} (ns) (β_{slow})**	**r_0**	**r_∞**	**S**
LUVs	0.558±0.0281 (0.242±0.007)	>175 (0.758±0.007)	0.37	0.25	0.82
LUVs +A11-positive Aβ oligomers	7.62±1.98 (0.186±0.023)	>175 (0.814±0.023)	0.37	0.28	0.87
LUVs +OC-positive Aβ oligomers	1.52±0.176 (0.182±0.009)	>175 (0.818±0.009)	0.37	0.26	0.84

Table S2. Typical parameters associated with the time-resolved DPH fluorescence intensity decay of LUVs of BTLE with and without Aβ oligomers using equation 2.

Sample	BTLE LUVs		POPC:POPS LUVs in 3:1 ratio	
	τ_1 (ns) (α_1)	**τ_2 (ns) (α_2)**	**τ_1 (ns) (α_1)**	**τ_2 (ns) (α_2)**
LUVs	4.98±0.05 (0.10±0.02)	11.06±0.20 (0.90±0.02)	4.25±0.07 (0.16±0.03)	9.22±0.06 (0.84±0.03)
LUVs +A11-positive Aβ oligomers	2.84±0.04 (0.69±0.01)	9.15±0.13 (0.31±0.01)	3.14±0.05 (0.53±0.01)	8.57±0.045 (0.47±0.01)
LUVs +OC-positive Aβ oligomers	3.07±0.18 (0.15±0.01)	10.77±0.11 (0.85±0.02)	4.14±0.06 (0.23±0.01)	9.06±0.03 (0.77±0.01)

Table S3. Typical parameters associated with the time-resolved fluorescence anisotropy decay of N-terminal FAM-labeled Aβ oligomers and lipid-bound FAM-labeled Aβ oligomers using equation 5.

Sample	**ϕ_{fast} (ns) (β_{fast})**	**ϕ_{slow} (ns) (β_{slow})**
A11-positive Aβ oligomers	0.368±0.015 (0.712±0.007)	2.38±0.01 (0.288±0.007)
OC-positive Aβ oligomers	0.345±0.009 (0.742±0.005)	2.28±0.12 (0.258±0.005)
LUVs + A11-positive Aβ oligomers	0.335±0.019 (0.823±0.007)	2.67±0.11 (0.177±0.007)
LUVs + OC-positive Aβ oligomers	0.370±0.020 (0.710±0.007)	2.69±0.08 (0.287±0.007)