

Supporting Information

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SI Text

Vesicles shrink when nanoparticles are added. Fluorescence correlation spectroscopy (FCS) showed that the adsorption of anionic (carboxyl-modified) nanoparticles caused DLPC liposomes to shrink, as summarized in Fig. S1). It is worth noting that

when DLPC passes from the fluid to gel phase, the area per PC head group decreases (1) from ≈ 0.65 to ≈ 0.4 nm² (2), implying a volume change of $\approx 40\%$. This is close to the $\approx 20\%$ shrinkage of the mean liposome diameter that we observed. It is also consistent with the known (2) permeability of DLPC to water.

1. Gurtovenko AA, Patra M, Karttunen M, Vattulainen I (2004) Cationic DMPC/DMTAB lipid bilayers: Molecular dynamics study. *Biophys J* 86:3461–3472.
2. Olbrich K, Rawicz W, Needham D, Evans E (2000) Water permeability and mechanical strength of polyunsaturated lipid bilayers. *Biophys J* 79:321–327.

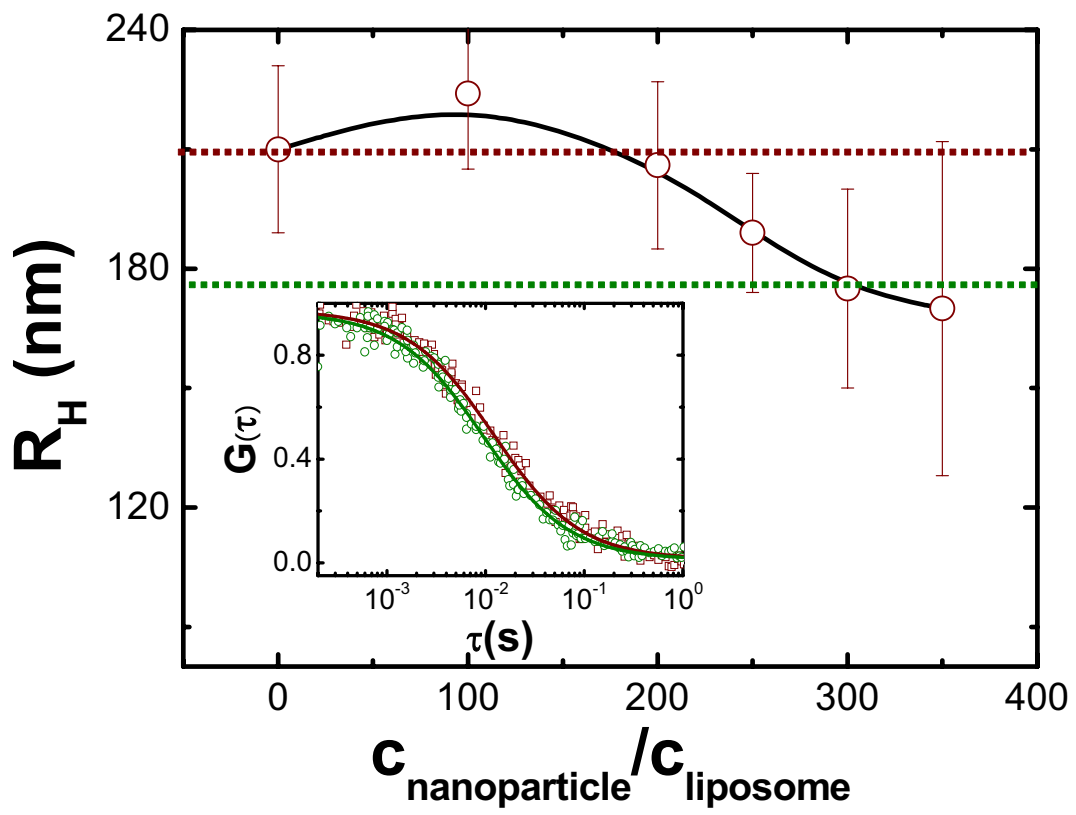


Fig. S1

Table S1. Alternative description of the fluorescence lifetime decays

	α_1	τ_1 , ns	α_2	τ_2 , ns
τ_D	0.17 ± 0.02	0.70 ± 0.08	0.74 ± 0.01	5.94 ± 0.31
τ_{D}^{NP}	0.19 ± 0.01	1.03 ± 0.07	0.80 ± 0.01	6.35 ± 0.25
τ_{DA}	0.37 ± 0.01	0.44 ± 0.01	0.54 ± 0.01	2.79 ± 0.05
τ_{DA}^{NP}	0.41 ± 0.01	0.80 ± 0.02	0.59 ± 0.01	4.05 ± 0.09

Rather than the mean lifetime quoted in the caption of Fig. 3, this table tabulates a decomposition of the lifetime decay into the sum of 2 separate exponential decays with amplitudes α_1 and α_2 and exponential time constants τ_1 and τ_2 , respectively. Wherever present, the superscript NP denotes the presence of adsorbed nanoparticles and the subscripts D and A refer to the presence of donor and acceptor fluorescent dyes, respectively.