Supplementary information



Fig. S1: A) GIXD pattern (intensity vs. Q_{xy} and Q_z) for a DPPE-DSTAP (70-30) monolayer at 30 mN/m on pure water. B) 2-D fitting of the GIXD pattern displaying the scattered intensity versus the in-plane and the out-plane components of the scattering vector, Q_{xy} and Q_z .

Reproduction of an electronic density profile

The electron density profile reported in Petrache et al ¹ was reproduced with a 5slab model comprising slabs for the headgroups, tails, and the central methyl dip of the bilayer (Fig. S2). Model parameters (slab electron densities, slab thicknesses, and interfacial roughness) that almost perfectly reproduce the profile were obtained in a least square minimization procedure.



Fig. S2: Reproduction (red solid line) of the absolute electron density profile data (empty dots) for DMPC bilayers in a fluid L_{α} phase extracted from Petrache et al. ¹.



Fig. S3: XRR data (grey dots) with the corresponding fitted intensity curve (solid blue line) for the trilayer system (DPPE-DSTAP monolayer + DMPC-DMPG vesicles) 6 hours after de vesicles spreading. In this curve, the values of the coverage fraction ($x_b = 1$) and the structural parameters of the bilayer (Table 2) were fixed. The values obtained are summarized in table S1. The solid red line shows how the XRR fitting curve would look by employing all the same parameters obtained by GIXOS (Tables 1 and 3).

	d (Å)		ρ (e/ų)
Hm	9.1 ± 0.5		0.44 ± 0.01
Tm	17.9 ± 0.5		0.34 ± 0.01
		(Å)	
σ_1 (air/tm)		3.6 ± 0.5	
σ_2 (tm/hm)		1.2 ± 0.5	
σ_3 (hm/water)		5.2 ± 0.5	
d_w		8.2 ± 0.5	
$\sigma_{ m conv}$		4.5 ± 0.5	

Table S1: Parameters of the best XRR matching model for for the trilayer system (DPPE-DSTAP monolayer + DMPC-DMPG vesicles) 6 hours after SUVs injection.



Fig. S4: A) GIXD pattern (intensity vs. Q_{xy} and Q_z) for a DMPC-DMTAP (70-30) monolayer at 30 mN/m on pure water. B) 2-D fitting of the GIXD pattern displaying the scattered intensity versus the in-plane and the out-plane components of the scattering vector, Q_{xy} and Q_z .

References

1. H. I. Petrache, S. Tristram-Nagle and J. F. Nagle, *Chem Phys Lipids*, 1998, **95**, 83-94.