Supporting information

to

Not just a fluidifying effect: omega-3 phospholipids induce formation of non-lamellar structures in biomembranes

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Table S1 Scattering Length Densities (*SLDs*) and Molecular Volumes (*V*) used as input values for the Neutron Reflectivity fitting procedure.

Molecule	**Chemical Formula**	***SLD*** **[10^{-6} Å^{-2}]**	***V*** **[Å^3]**
Heavy Water	D_2O	6.3752	30.0428
Light Water	H_2O	-0.5594	29.9757
POPC (Tail)	$C_{32}H_{64}$	-0.2899	919.614
POPC (Headgroup)	$C_{10}H_{18}PO_8N$	1.8652	322.100
22:6-22:6PC (Tail)	$C_{42}H_{62}$	0.6543	722.940
22:6-22:6PC (Headgroup)	$C_{10}H_{18}PO_8N$	1.8652	322.100
Silicon	Si	2.0754	20.000
Silicon Oxide	SiO_2	3.2698	48.200

Table S2 Correlation time τ, order parameter S and coupling constant $<A>$ for 5- and 14-PCSL as derived from EPR spectra simulation. Errors are within 1%.

	τ (ns)		**S**		**$<A>$ (G)**	
$x_{22:6\text{-}22:6PC}$	5-PCSL	14-PCSL	5-PCSL	14-PCSL	5-PCSL	14-PCSL
0	8.4	1.39	0.42	0.15	14.5	14.17
0.2	7.44	1.22	0.42	0.15	14.43	14.16
0.4	7.34	1.13	0.418	0.15	14.43	14.15
0.5	7.25	0.75	0.415	0.145	14.43	14.41
0.6	6.23	0.38	0.4	0.14	14.47	14.55
0.8	5.56	0.37	0.403	0.13	14.48	14.55
1.0	5.45	0.21	0.403	0.105	14.49	14.67

Table S3 Correlation time τ, order parameter S and coupling constant $<A>$ as derived from EPR spectra simulation for different spin labels and two different POPC/22:6-22:6PC compositions. Errors are within 1%.

	τ (ns)		S		$<A>$ (G)	
$x_{22:6\text{-}22:6PC}$	**0.2**	**0.8**	**0.2**	**0.8**	**0.2**	**0.8**
5-PCSL	7.44	5.56	0.42	0.403	14.43	14.49
7-PCSL	4.2	3.1	0.41	0.39	14.43	14.3
10-PCSL	2.65	1.7	0.33	0.29	14.23	14.23
14-PCSL	1.22	0.37	0.15	0.13	14.16	14.55

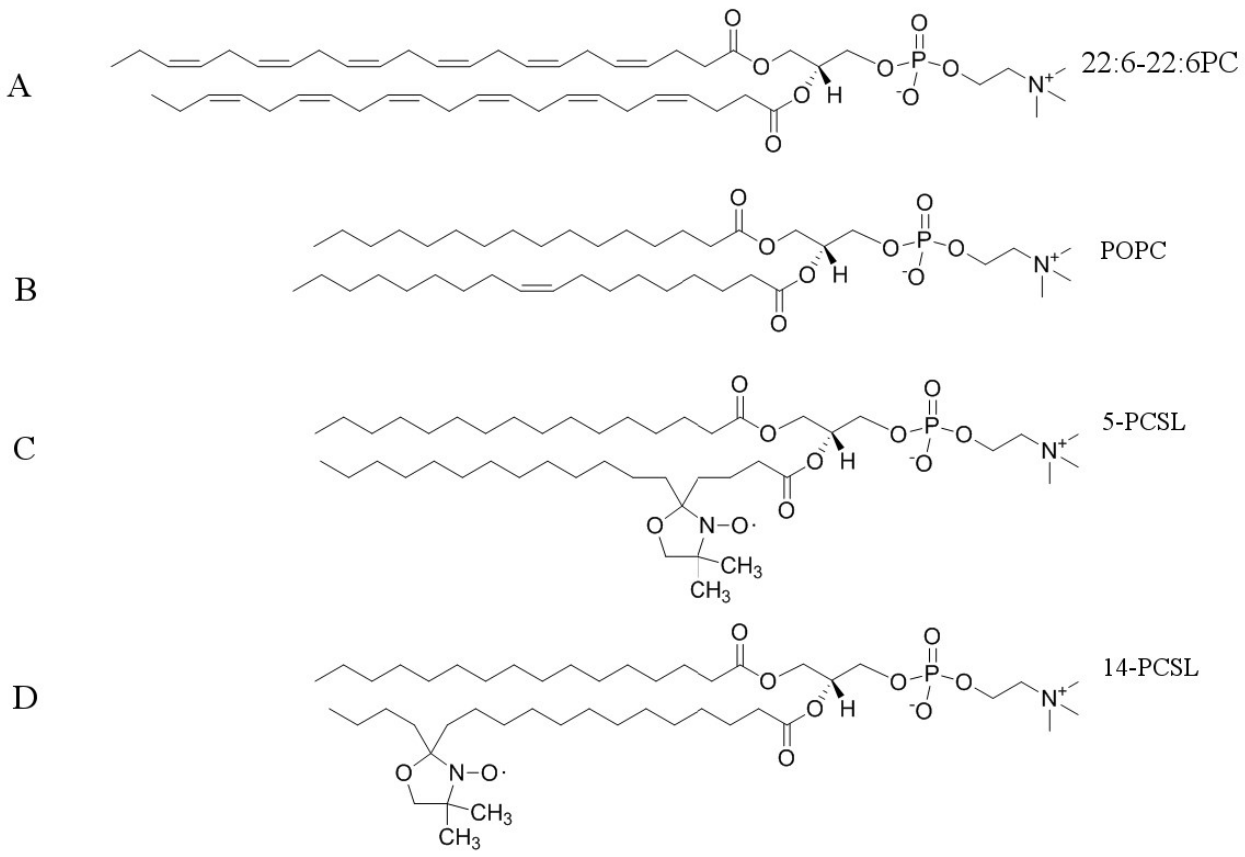

Fig. S1 Chemical structure of the phospholipid employed in the study: 1,2-didocosahexaenoyl-*sn*-glycero-3-phosphocholine (22:6-22:6PC) (A), 1-palmitoyl-2-oleoyl-*sn*-glycero-3-phosphocholine (POPC) (B), 5-PCSL (C) and 14-PCSL (D).

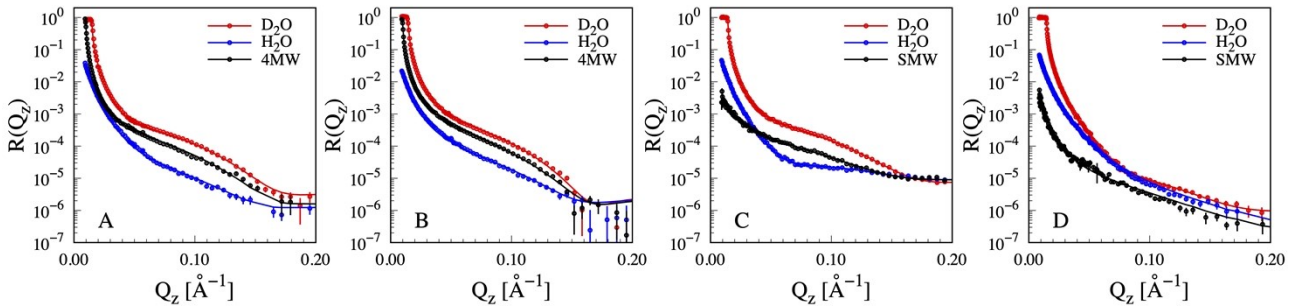

Fig. S2 Experimental data and best fitting curves in D_2O (red), H_2O (blue) and either 4MW (black in panel A and B) or SMW (black in panel C and D) for lipid systems: A) POPC, B) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC}$ = 0.2, C) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC}$ = 0.4, D) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC}$ = 0.8 respectively.

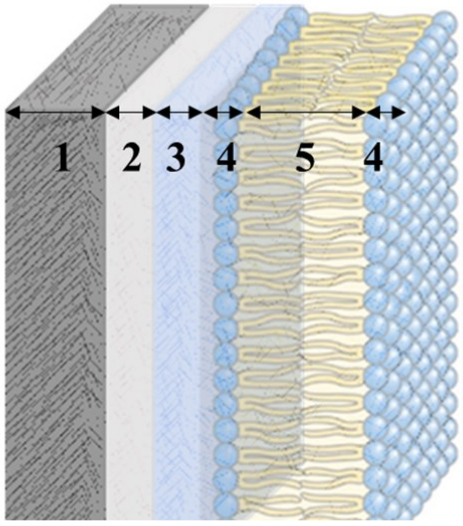

Fig. S3 Schematic representation of the model used for fitting of NR profiles with all chemical components explicitly shown: 1) Si block; 2) SiO_2 layer; 3) water, 4) headgroups, 5) tails of the lipids forming the bilayer.

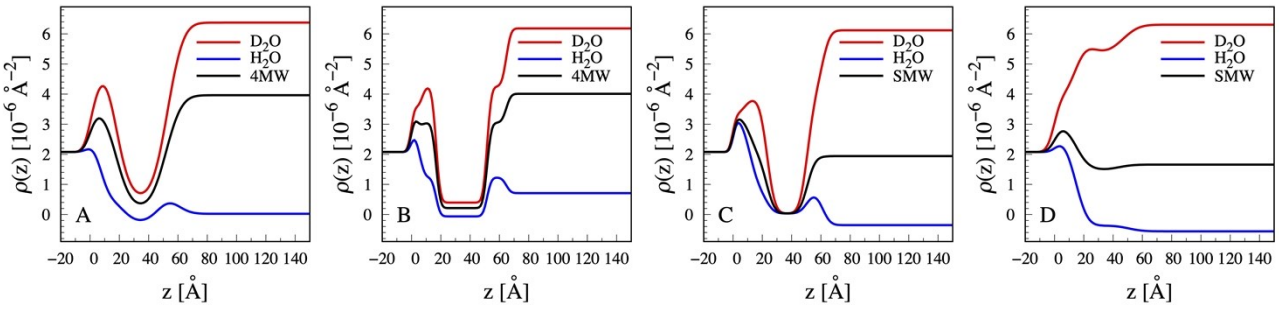

Fig. S4 *SLD* profiles corresponding to best fit of Neutron Reflectivity data in D_2O (red), H_2O (blue) and either 4MW (black in panel A and B) or SMW (black in panel C and D) for lipid systems: A) POPC, B) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC}$ = 0.2, C) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC}$ = 0.4, D) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC}$ = 0.8, respectively.

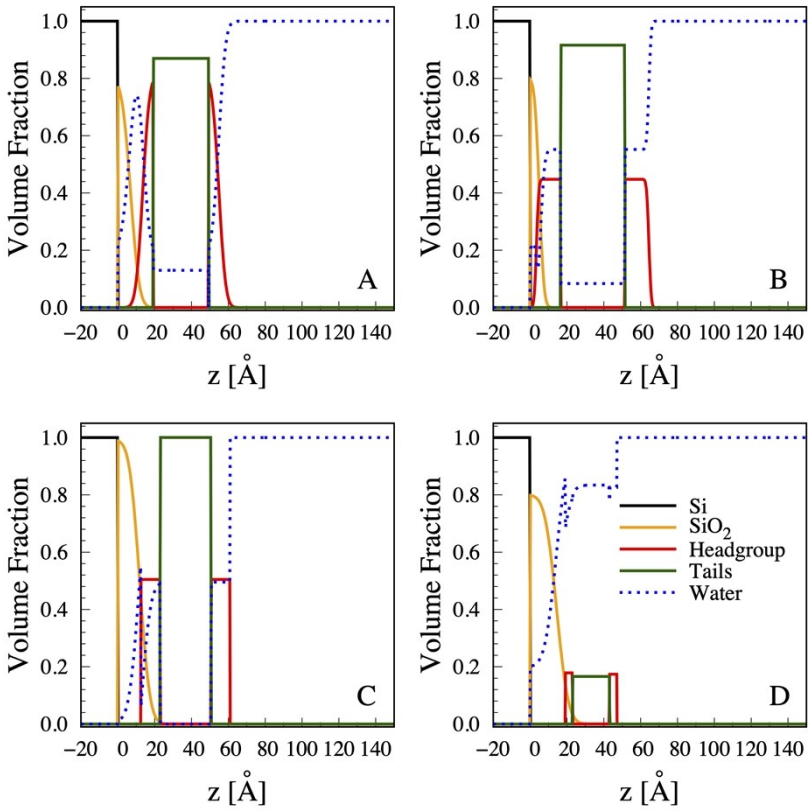

Fig. S5 Deconvoluted volume fraction distribution profiles for Silicon (black), SiO_2 (orange), lipid headgroup (red), lipid tails (green) and water (dashed blue line) for lipid systems: A) POPC, B POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC} = 0.2$, C) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC} = 0.4$ and D) POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC} = 0.8$, respectively.

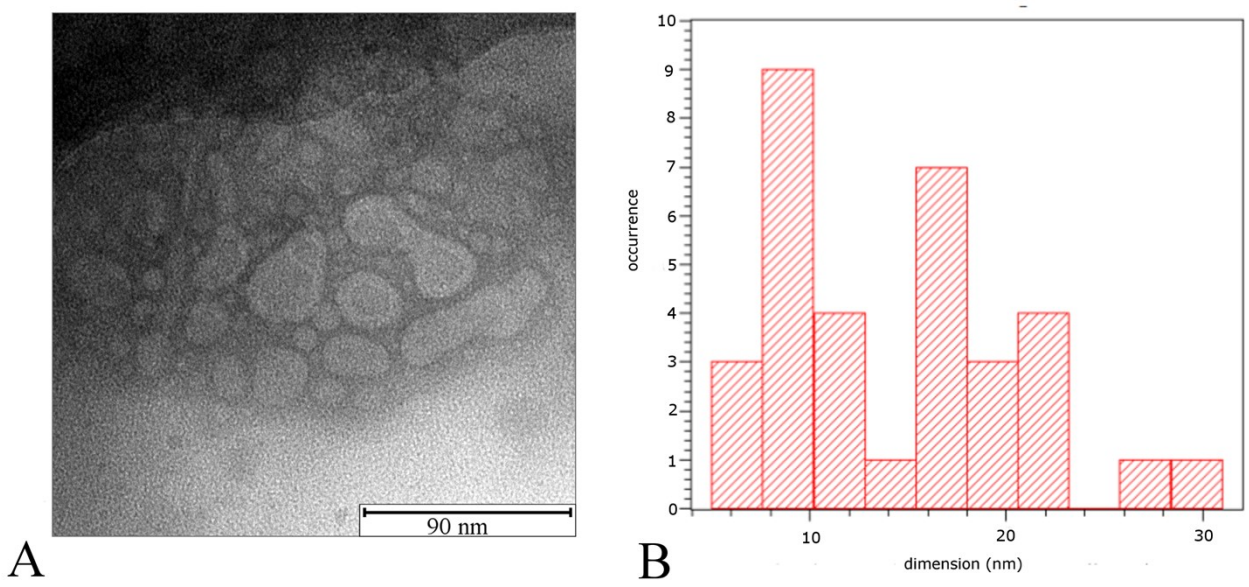

Fig. S6 Cryo-TEM micrograph of POPC/22:6-22:6PC $x_{22:6\text{-}22:6PC} = 0.8$ (A) and particle diameter distribution (B).

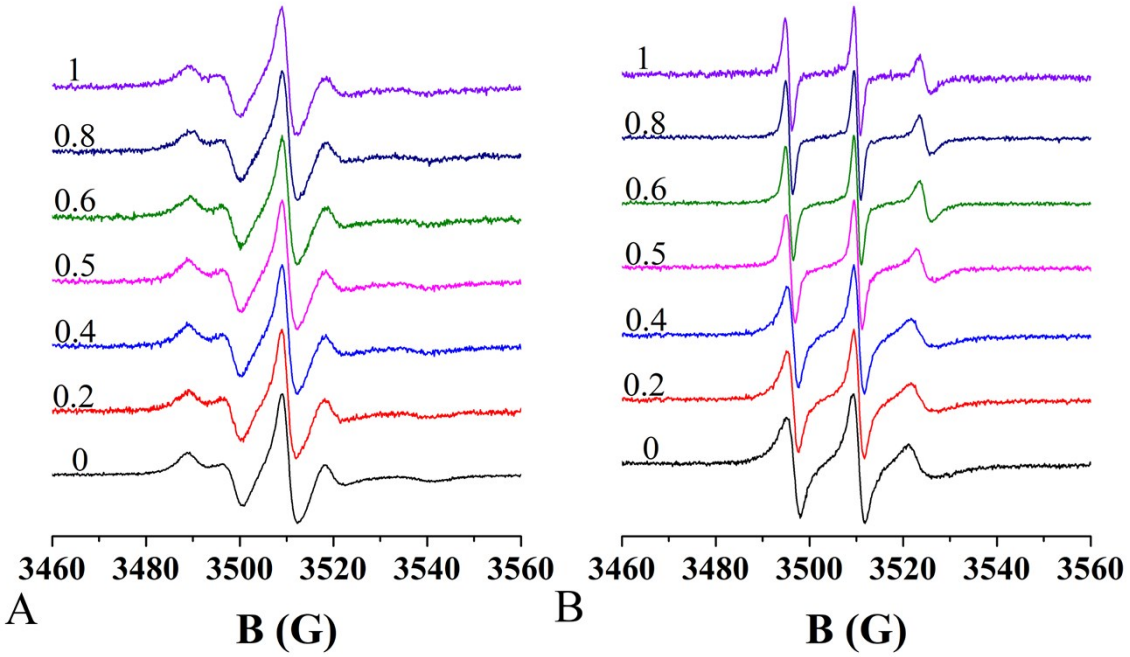

Fig. S7 EPR spectra of 5-PCSL (A) and 14-PCSL (B), in POPC/22:6-22:6PC systems with $x_{22:6\text{-}22:6PC}$ ranging from 0 to 1.

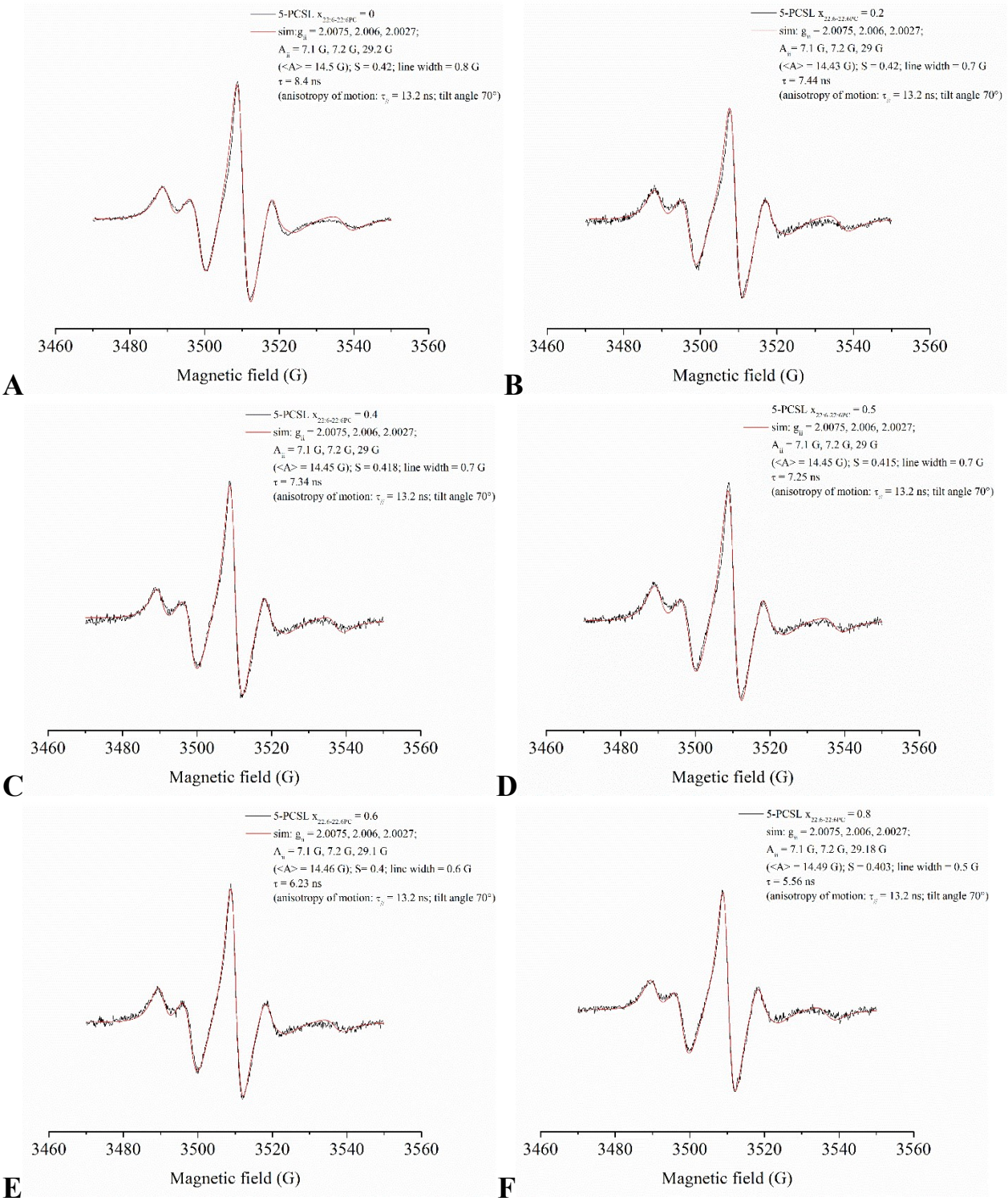

Fig. S8 Comparison between simulated (red) and experimental (black) EPR spectra of 5-PCSL in POPC/22:6-22:6PC systems with $x_{22:6\text{-}22:6PC}$ ranging from 0 to 0.8.

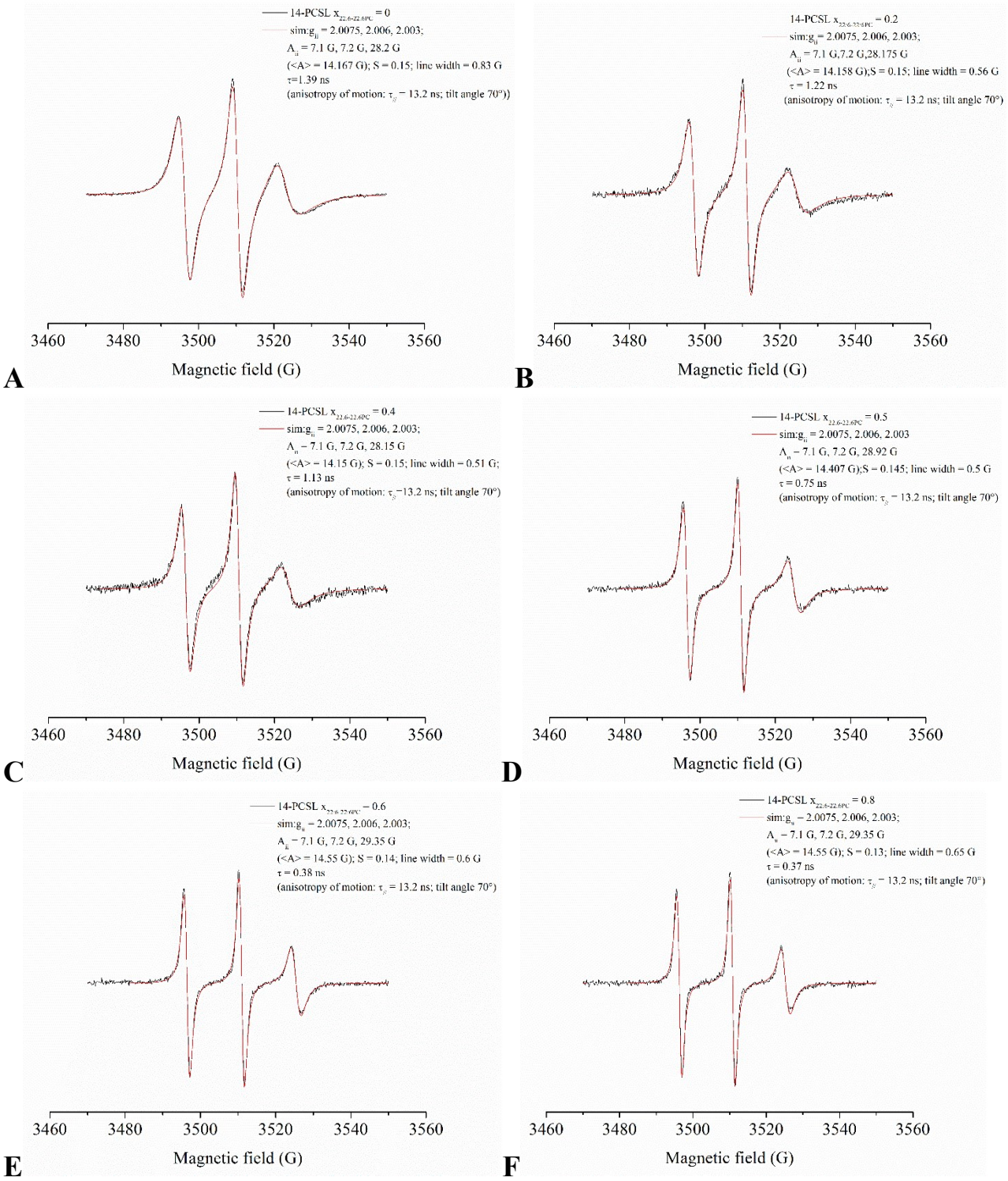

Fig. S9 Comparison between simulated (red) and experimental (black) EPR spectra of 14-PCSL in POPC/22:6-22:6PC systems with $x_{22:6\text{-}22:6PC}$ ranging from 0 to 0.8.