Electronic Supplementary Information (ESI) for

Enhanced self-assembly for the solubilization of cholesterol in molecular solvent/ionic liquid mixtures

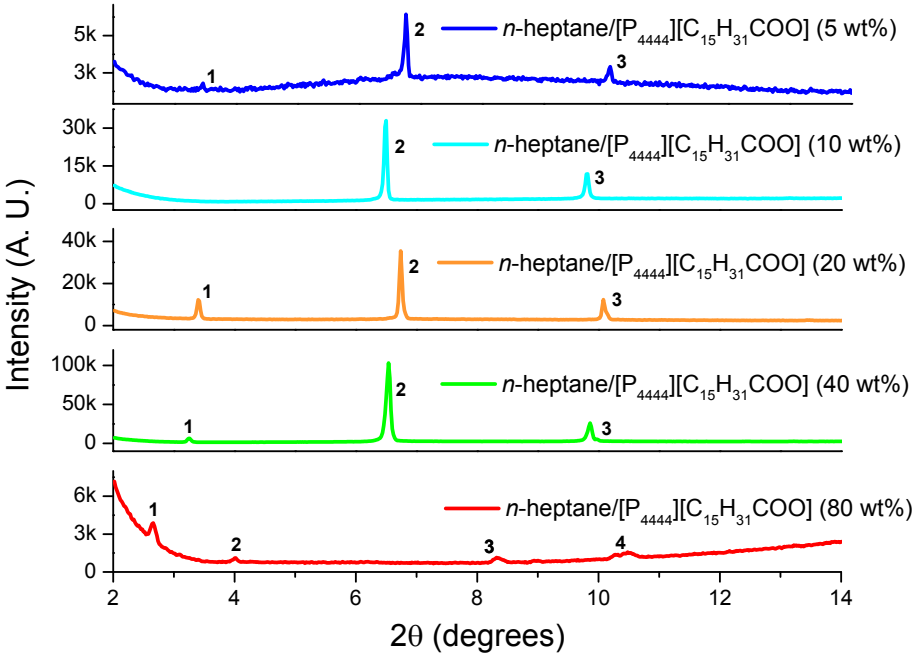


Fig. S1 WAXD patterns of the *n*-heptane/$[P_{4444}][C_{15}H_{31}COO]$ mixture with a fixed cholesterol concentration of 0.40 as *n*-heptane's concentration from 5 wt% to 80 wt% at ambient temperature.

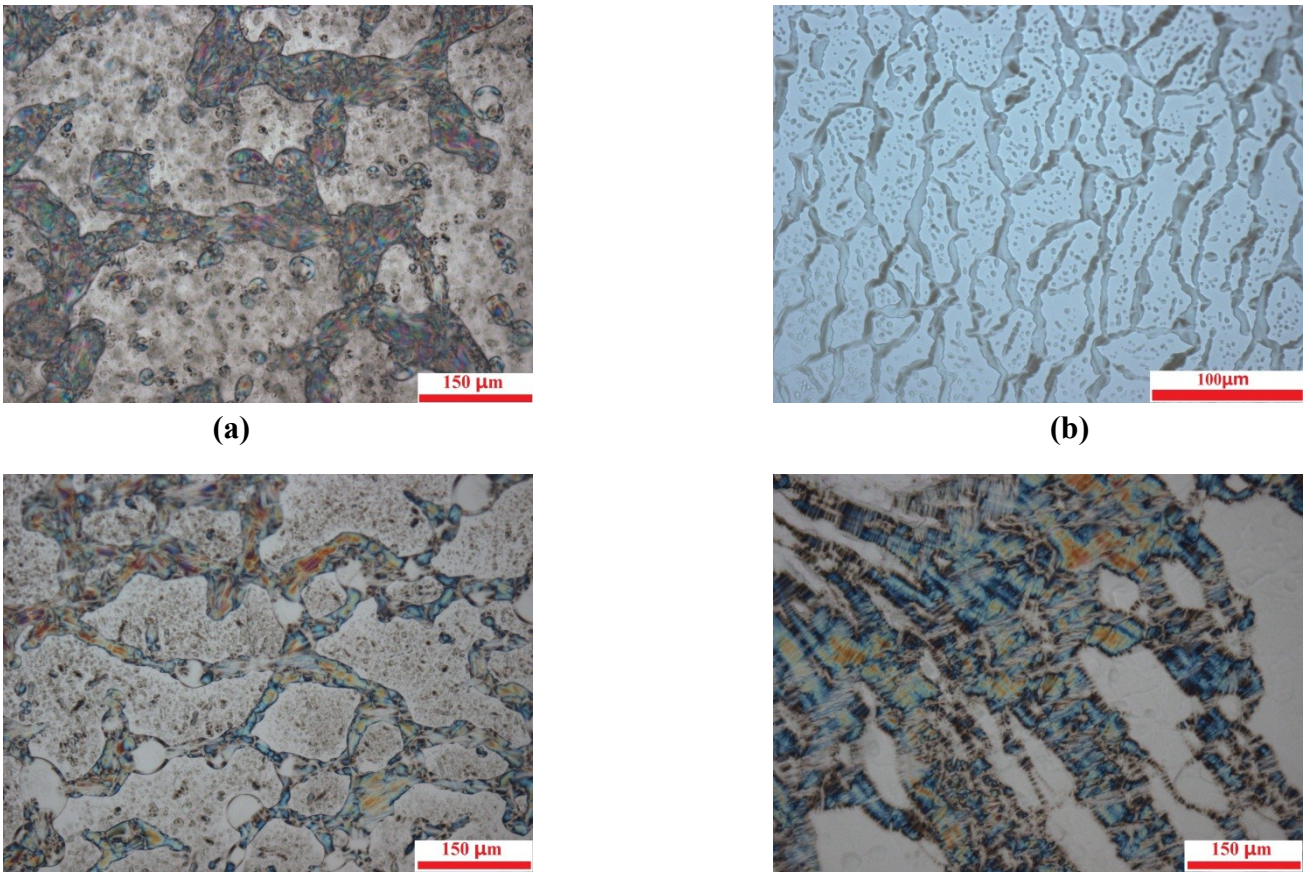
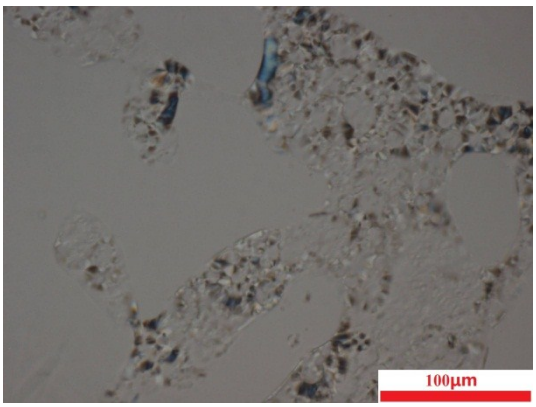
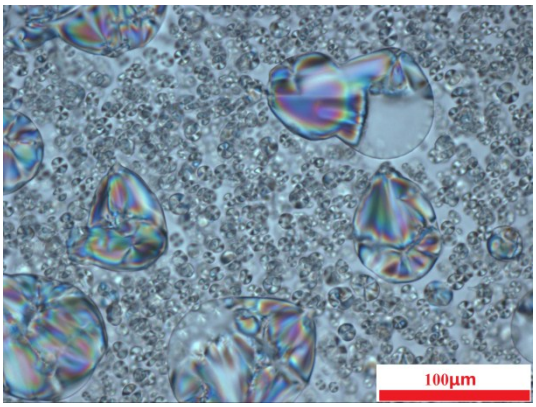


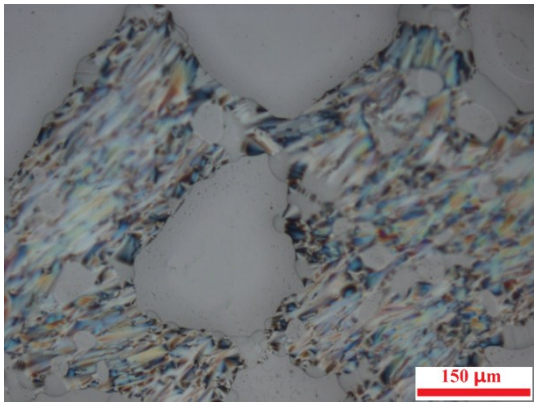
Fig. S2 POM images of the *n*-heptane/[P_{4444}][$C_{15}H_{31}COO$] mixture with a fixed cholesterol concentration of 0.40 as *n*-heptane's concentration from 5 wt% to 80 wt% at ambient temperature. (a) 5 wt%; (b) 10 wt%; (c) 20 wt%; (d) 80 wt%. The scale bar is presented as marked above.



(a)



(b)



(c)

Fig. S3 POM images of the DMSO/[P_{4444}][$C_{15}H_{31}COO$] (10 wt%) (a), methanol/[P_{4444}][$C_{15}H_{31}COO$] (15 wt%) (b), and EA/[P_{4444}][$C_{15}H_{31}COO$] (40 wt%) (c) mixtures with a fixed cholesterol concentration of 0.40 at ambient temperature. The scale bar is presented as marked above. (Note: the temperature in (a) is 35°C as the solubility is less than 0.40 at ambient temperature.)

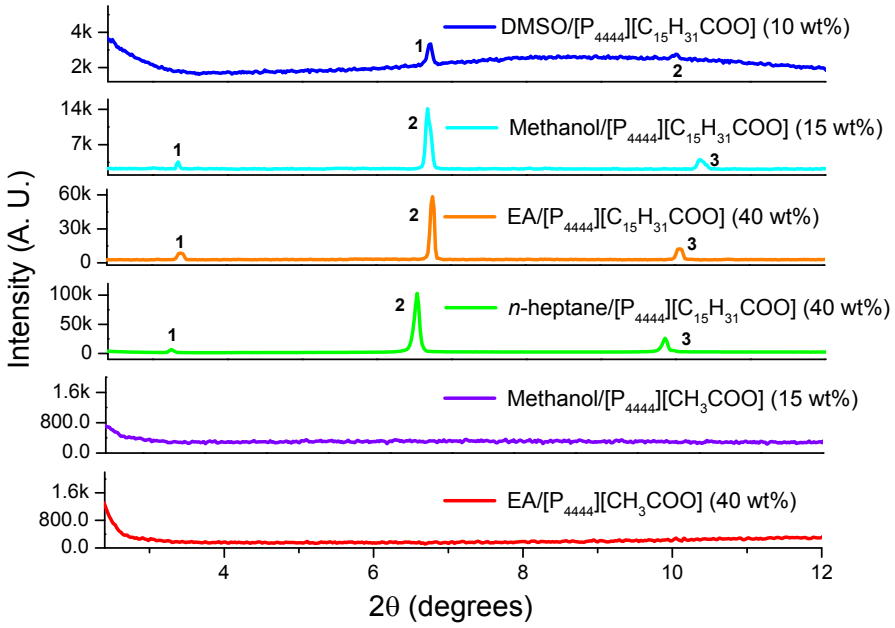


Fig. S4 WAXD patterns (from top to bottom) of the DMSO/$[P_{4444}][C_{15}H_{31}COO]$ (10 wt%) (blue), methanol/$[P_{4444}][C_{15}H_{31}COO]$ (15 wt%) (cyan), EA/$[P_{4444}][C_{15}H_{31}COO]$ (40 wt%) (orange), *n*-heptane /$[P_{4444}][C_{15}H_{31}COO]$ (40 wt%) (green), methanol/$[P_{4444}][CH_3COO]$ (15 wt%) (violet), and EA/$[P_{4444}][CH_3COO]$ (40 wt%) (red), mixtures with a cholesterol concentration of 0.40 for $[P_{4444}][C_{15}H_{31}COO]$ systems and saturated cholesterol for $[P_{4444}][CH_3COO]$ systems at ambient temperature.

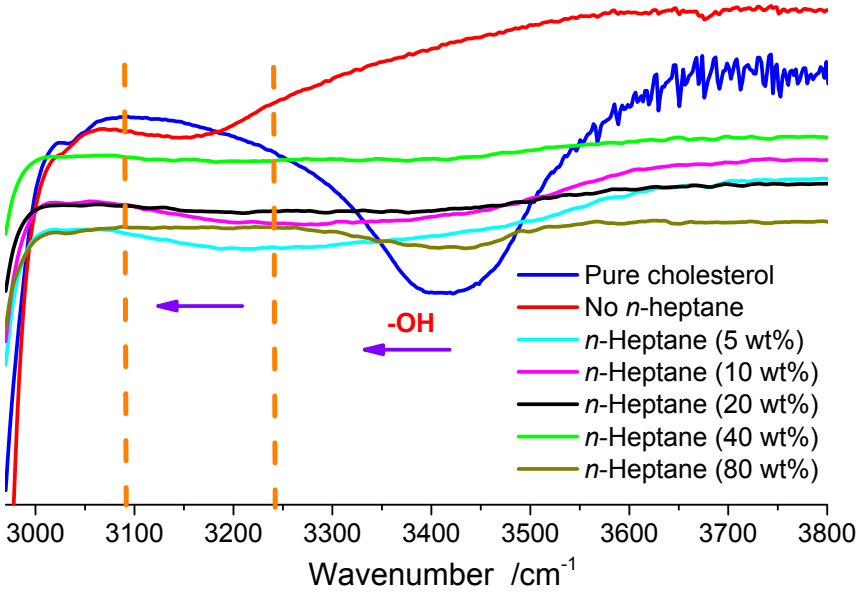


Fig. S5 IR spectrum of cholesterol and cholesterol dissolved in *n*-heptane/$[P_{4444}][C_{15}H_{31}COO]$ with *n*-heptane's concentration from 0 to 80 wt% at ambient temperature.

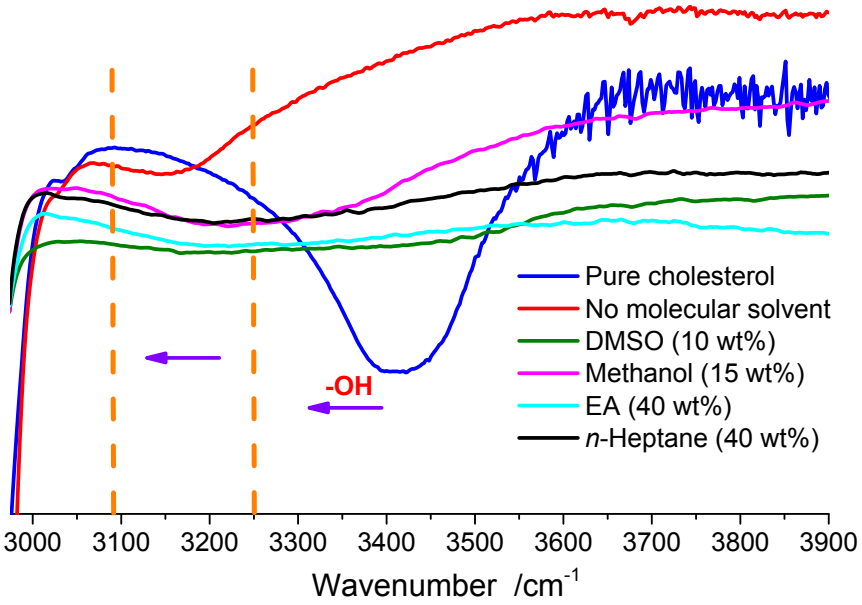


Fig. S6 IR spectrum of cholesterol (blue line) and cholesterol dissolved in pure $[P_{4444}][C_{15}H_{31}COO]$ (red line), DMSO/$[P_{4444}][C_{15}H_{31}COO]$ (10 wt%) (green line), methanol/$[P_{4444}][C_{15}H_{31}COO]$ (15 wt%) (magenta line), EA/$[P_{4444}][C_{15}H_{31}COO]$ (40 wt%) (cyan line), and *n*-heptane/$[P_{4444}][C_{15}H_{31}COO]$ (black line) respectively, at ambient temperature.

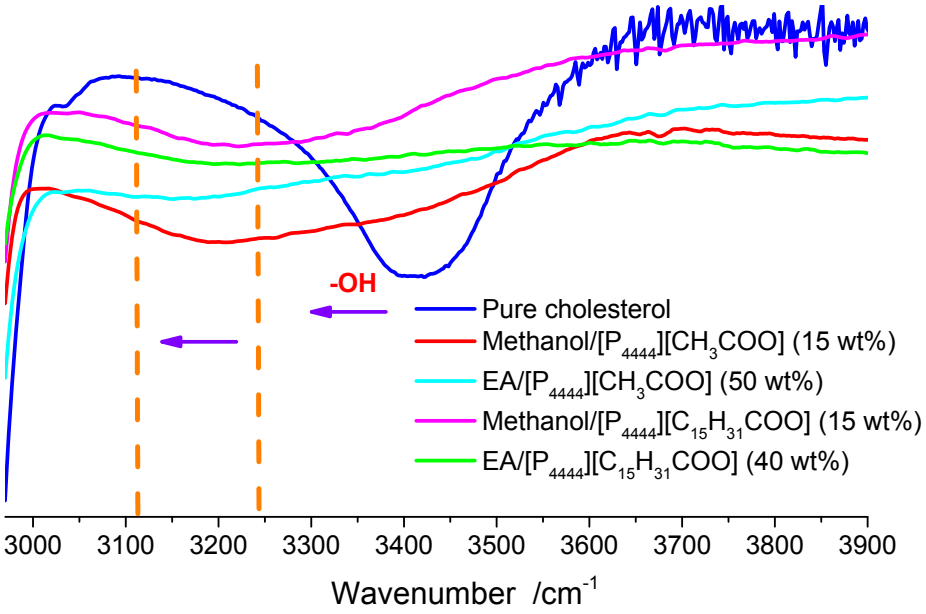
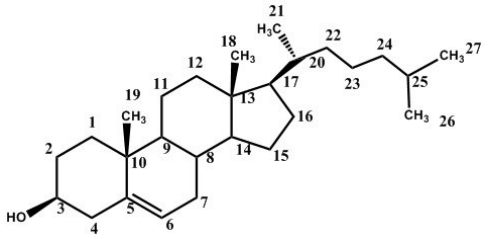


Fig. S7 IR spectrum of cholesterol (blue line) and cholesterol dissolved in methanol/$[P_{4444}][CH_3COO]$ (15 wt%) (red line), EA/$[P_{4444}][CH_3COO]$ (50 wt%) (cyan line), methanol/$[P_{4444}][C_{15}H_{31}COO]$ (15 wt%) (magenta line), and EA/$[P_{4444}][C_{15}H_{31}COO]$ (40 wt%) (green line) respectively, at ambient temperature.

Table S1 The molecular structure of cholesterol and ^{1}H NMR spectrum shift of cholesterol in molecular solvent/$[P_{4444}][C_{15}H_{31}COO]$ mixtures with a fixed cholesterol concentration of 0.40

Molecular structure of Cholesterol				
Mixtures	Δδ=δ(complex)- δ(free) /(ppm)			
	H2	H3	H4	H6
n-heptane/$[P_{4444}][C_{15}H_{31}COO]$ (20 wt%)	-0.028	-0.03	-0.052	-0.029
n-heptane/$[P_{4444}][C_{15}H_{31}COO]$ (80 wt%)	-0.023	-0.023	-0.036	-0.023
EA/$[P_{4444}][C_{15}H_{31}COO]$ (40 wt%)	-0.027	-0.032	-0.051	-0.027
DMSO/$[P_{4444}][C_{15}H_{31}COO]$ (10 wt%)	-0.029	-0.034	-0.052	-0.03
methanol/$[P_{4444}][C_{15}H_{31}COO]$ (15 wt%)	-0.028	-0.033	-0.054	-0.03