

Electronic Supplementary Information

PVA/Guanidinium oleate Transdermal Patch as a pH-responsive Drug Delivery System for the Localized and Targeted Delivery of Anticancer Drug

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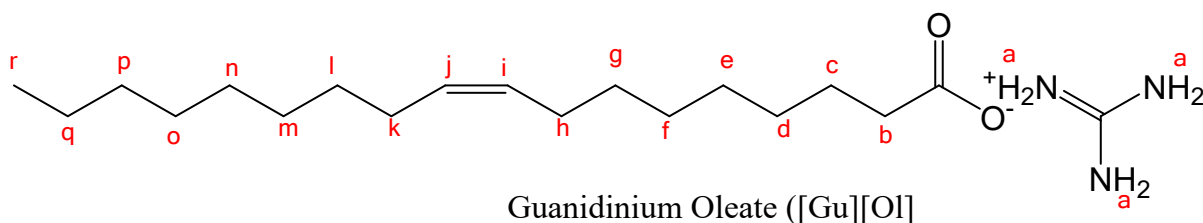
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Synthesis of SAIL Guanidinium Oleate ([Gu][OI])

Guanidinium Oleate ([Gu][OI]) was synthesized as per previously reported method of synthesis of Guanidinium carboxylate.¹ In brief, guanidinium carbonate was dissolved in methanol, and equimolar amount of oleic acid was added to it. The reaction mixture was stirred for an hour at 50 °C until a clear solution was obtained. Solvent was removed by rotary evaporation. A soft yellowish-brown gel was formed which was further dried in vacuume oven at 40°C overnight to remove moisture. The formation of [Gu][OI] was confirmed through NMR analysis which showed only trace impurities.

¹H NMR (CDCl₃): δ/ppm = 0.9 (t, 3H) – r; 1.3 to 1.5 (m, 22H) – d to q; 2.02 (m, 2H) – h; 2.10 (m, 2H) – k; 2.7 (t,2H) – b; 5.33 (q, 2H) – i,j; 7.42 (s, 5H) – a (Figure S1)



GuO1
1H_8scan CDC13 {D:\Spectra} nmr 13

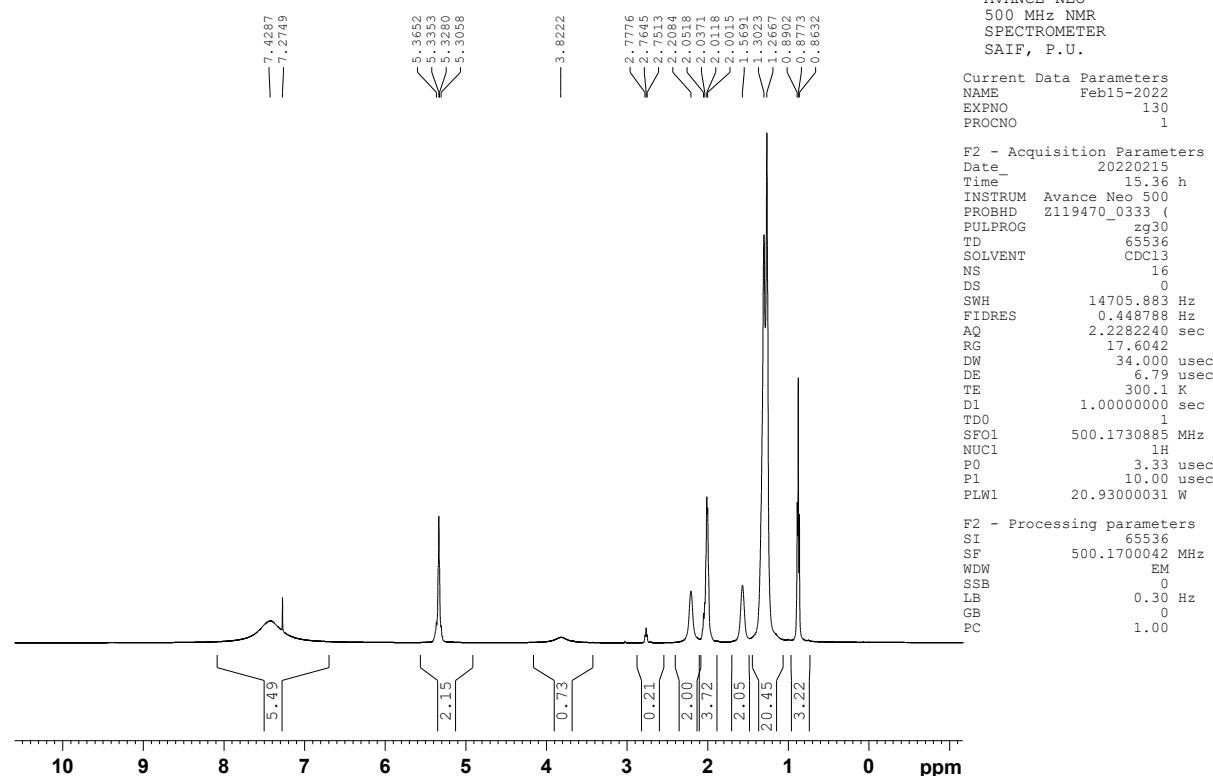


Figure S1: ^1H NMR spectra of synthesized SAIL [Gu][OI]

Critical micellar concentration (cmc) and surface active parameters calculation through surface tension measurement

cmc of synthesized SAIL was measured through surface tension measurement of [Gu][OI] aqueous solution at successive different concentrations. Surface tension was measured through du Noüy ring method on Krüss K9 tensiometer at 25 ± 0.1 °C. The measured surface tension values ($\gamma \pm 0.1$ mNm $^{-1}$) were corrected according to the procedure of Harkins and Jordan, built-in in the instrument software.

Table S1 shows the surface active and micellization characteristics resulting from surface tension studies, which are compared to SAILs and surfactant having similar oleate anion but different cationic head groups i.e. Choline oleate and sodium oleate. As per the best of our knowledge, the surface active and micellization characteristics of [Gu][OI] have not yet been reported in literature.

Figure 2 shows the plot of surface tension and log of concentration of [Gu][OI].

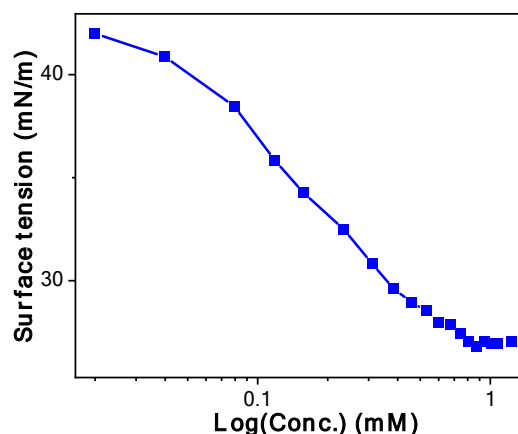


Figure S2: Plot of surface tension and log of concentration of [Gu][OI]

Table S1: Surface active parameters of [Gu][OI]

SAIL	cmc (mM)	γ_{cmc} (mN/m)	Γ_{max} ($\mu\text{mol}/\text{m}^2$)	A_{min} (\AA^2)	π_{cmc} (mN/m)	Ref.
[Ch][OI]	1.7	25.4	3.30	50	46.1	Our previous work
[Ch][OI]	1.7	24.4	3.80	43.2	47.1	²
NaOl	0.63	34.7	2.35	70.6	36.7	³
NaOl	0.45	-	4.20	-	-	⁴
[Gu][OI]	0.9	26.9	2.00	83	43.4	This work

The uncertainties in the calculated parameters are: $\gamma_{cmc} = \pm 0.1$ mN/m; $\pi_{cmc} = \pm 0.1$ mN/m; $\Gamma_{max} = \pm 0.2 \times 10^{-6}$ mol/m²; $A_{min} = 0.5$ \AA^2

References

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