Electronic Supplementary Material (ESI) for Soft Matter
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Supplementary Information

Molecular Weight Dependence of Non-Surface Activity for Ionic Amphiphilic Diblock Copolymers

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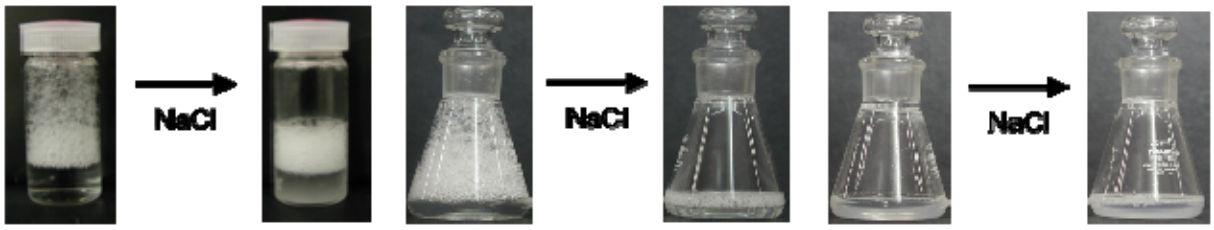


Figure S1 Foam formation and salt effect for (left) sodium dodecyl sulfate (middle) $(St)_{18}$-b-$(SSNa)_{18}$, and (right) $(St)_{54}$-b-$(SSNa)_{51}$ in aqueous solutions. Added NaCl concentration was 0.5 M.

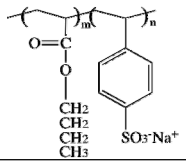
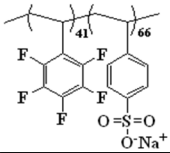
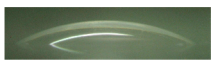
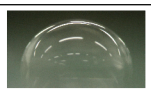
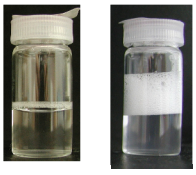
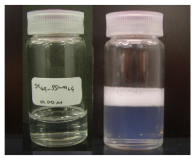
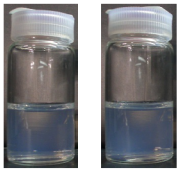
Polymer	*n*BuA $_m$ - *b* - SSNa $_n$ 	St $_m$ - *b* - SSNa $_n$ 	(PFS)$_m$-*b*-(SSNa)$_n$ 
Hydrophobicity	 33°	 85°	 97°
Tg	-56 ° C	100 ° C	107 ° C
Surface Tension	Slightly reduced at high concentration	No salt: almost no reduction Added salt : Slightly reduced at high concentration	No salt: No reduction Added salt: No reduction
Foam Formation	No salt: low Added salt: slightly 	No salt: extremely low Added salt: slightly 	No salt: None Added salt: None 

Figure S2 Effect of hydrophobicity of hydrophobic block on non-surface activity. (m and n values are in the range of 40-60 for all polymers) It is clear that more hydrophobic, more non-surface active when the ionic hydrophilic block is the same.

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S3 Block Copolymer Synthesis

In principle, *n*-BuAc was first polymerized with AIBN as an initiator and DEPN as a mediator at 120°C after three cycles of freeze-thaw degassing process. With this *n*-BuAc homo polymer as a macroinitiator, SSPen was polymerized in benzene at 120°C. The neopenthyl unit, a protecting group of sulfonic unit, was hydrolyzed by reaction with trimethylsilyl iodide (TMSI) in chloroform, whose details were fully described in our previous paper.[2] With keeping constant ratio of initiator, mediator, and monomer (AIBN:DEPN:*n*BuAc=1:2.5:200 for the first step, and macroinitiator:DEPN:SSPen=1:0.3:100 for the second step), polymers with different *m* and *n* values were synthesized by tuning the polymerization time (30 – 120 min for the first step, and 10 – 60 min for the second step). $CHCl_3$ and TMSI were removed from the resultant solution by evaporation, then 1.0M HCl aq/methanol (1:1) was added and stirred for 3 hours. After neutralization by 1M NaOH, the polymer was purified by dialysis and lyophilized.