Supplementary Information

Novel molecularly engineered deep eutectic surfactant from Gemini ionic liquid and methylurea for EOR utilization: A joint experimental and computational study

Shima Yaghoubi[1], Javad Saien[*,1], Mona Kharazi[1], Ehsan Alvaipour[2], Mehdi Bayat[3]

[1]*Department of Applied Chemistry, Faculty of Chemistry and Petroleum Sciences, Bu–Ali Sina University, Hamedan, Iran*
[2]*Department of Inorganic Chemistry, Faculty of Chemistry and Petroleum Sciences, Bu–Ali Sina University, Hamedan, Iran*
[3]*School of Chemistry, College of Science, University of Tehran, Tehran, Iran*

Content

[*]Corresponding author
E-mail addresses: saien@basu.ac.ir and jsaien@yahoo.com (J. Saien)

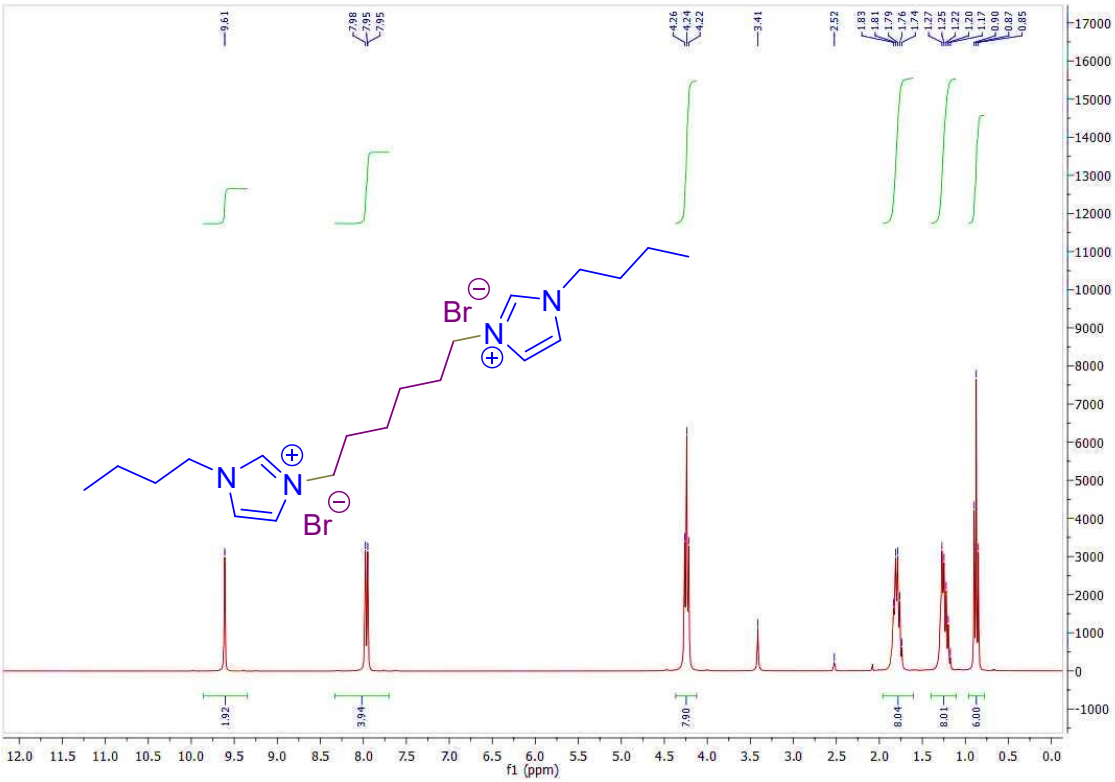

Fig. S1. ^{1}H NMR spectrum of 3,3'-(hexane-1,6-diyl)bis(1-butyl-1*H*-imidazol-3-ium) bromide.

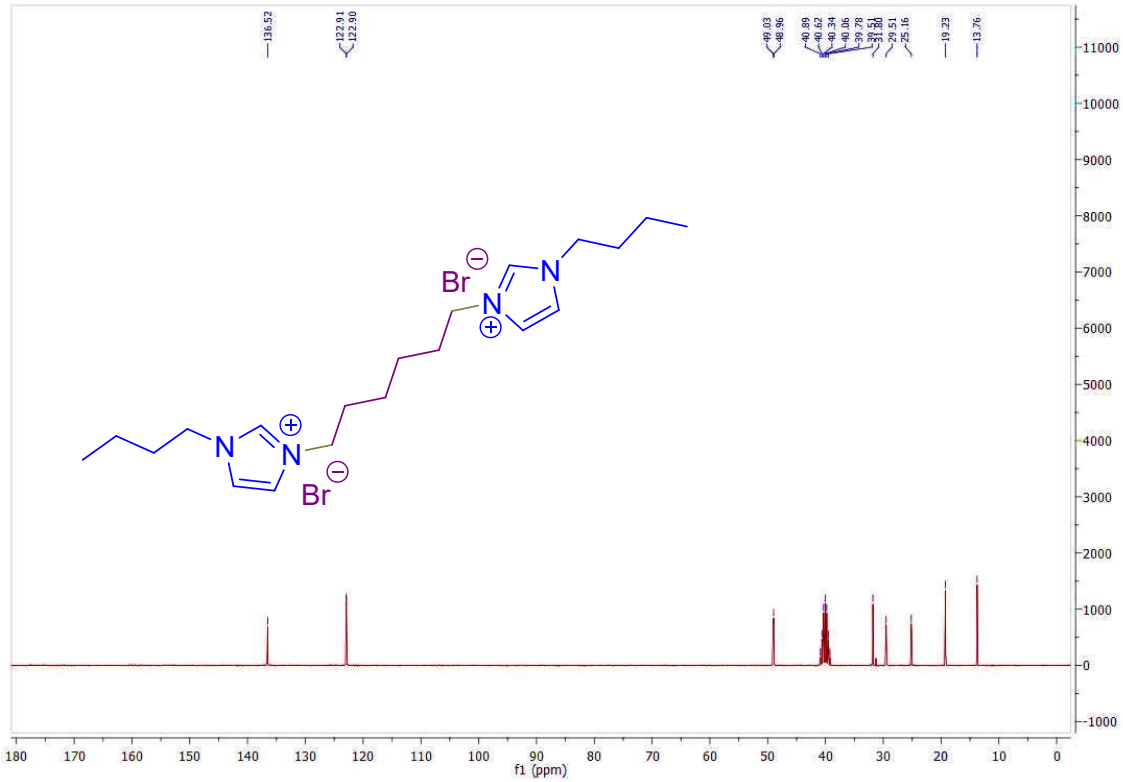

Fig. S2. ^{13}C NMR spectrum of 3,3'-(hexane-1,6-diyl)bis(1-butyl-1*H*-imidazol-3-ium) bromide.

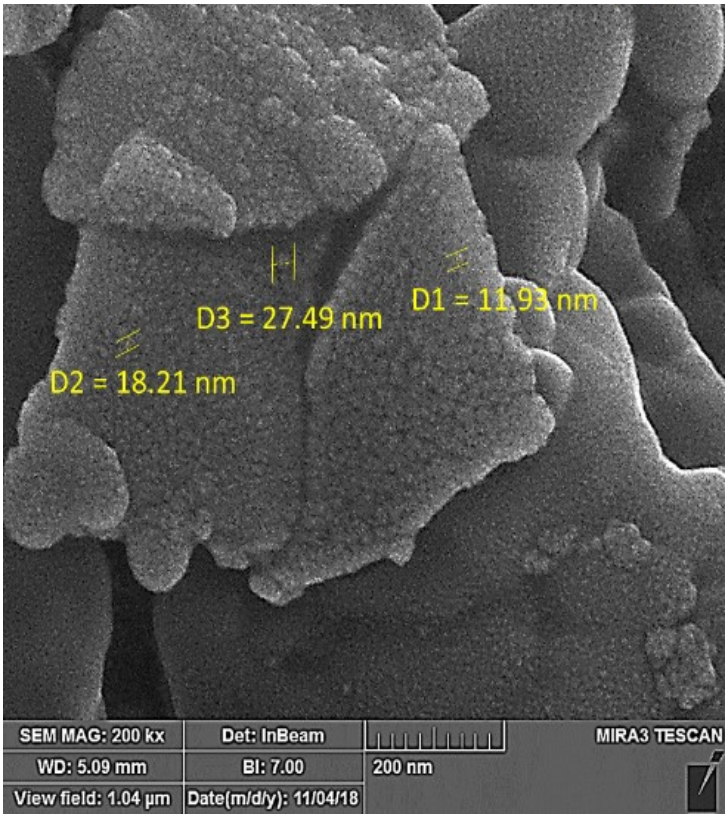

Fig. S3. The SEM images of 3,3'-(hexane-1,6-diyl)bis(1-butyl-1*H*-imidazol-3-ium) bromide.

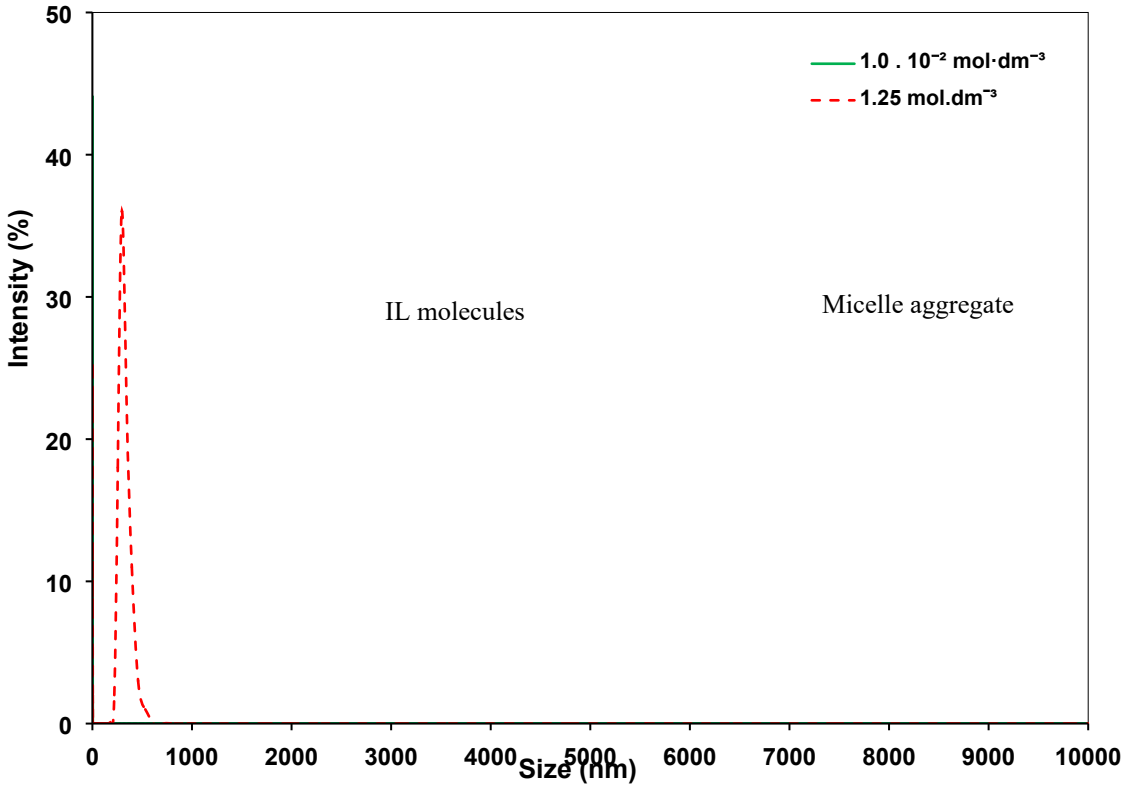

Fig. S4. DLS analysis of of 3,3'-(hexane-1,6-diyl)bis(1-butyl-1*H*-imidazol-3-ium) bromide solutions at two representative concentrations, measured before and after the CMC point under natural pH and at 298.2 K.

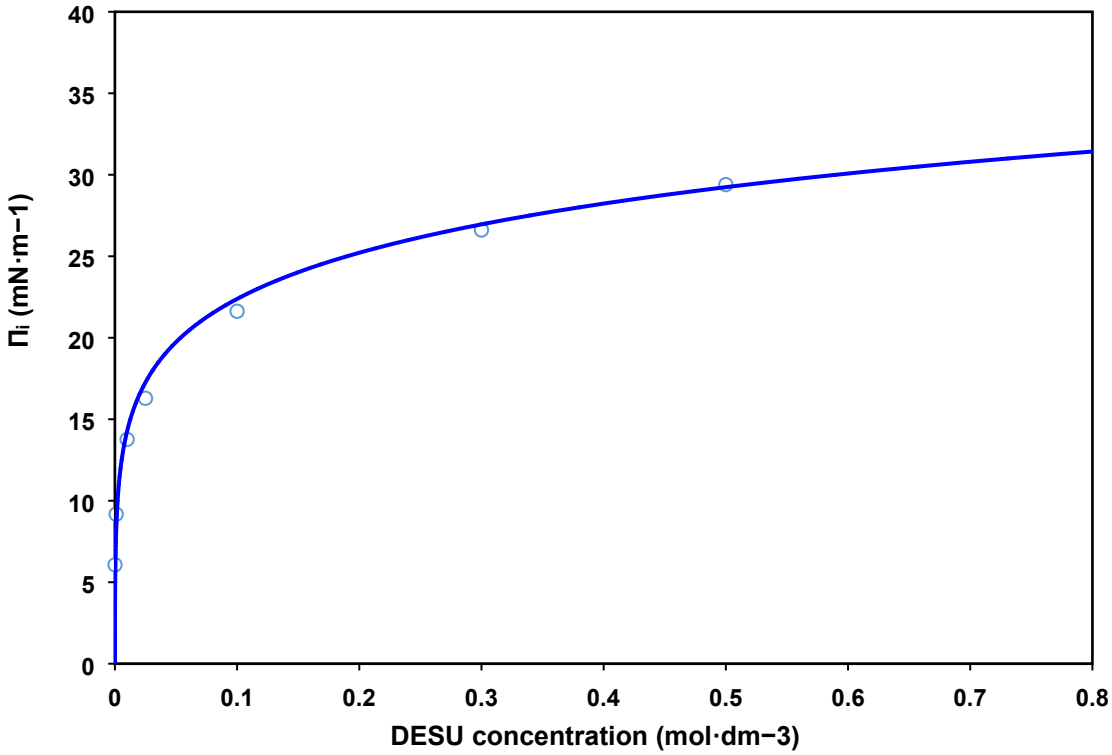

Fig. S5. Fitting the experimental data with the Frumkin adsorption isotherm for the system containing DESU at the temperature of 298.2 K.

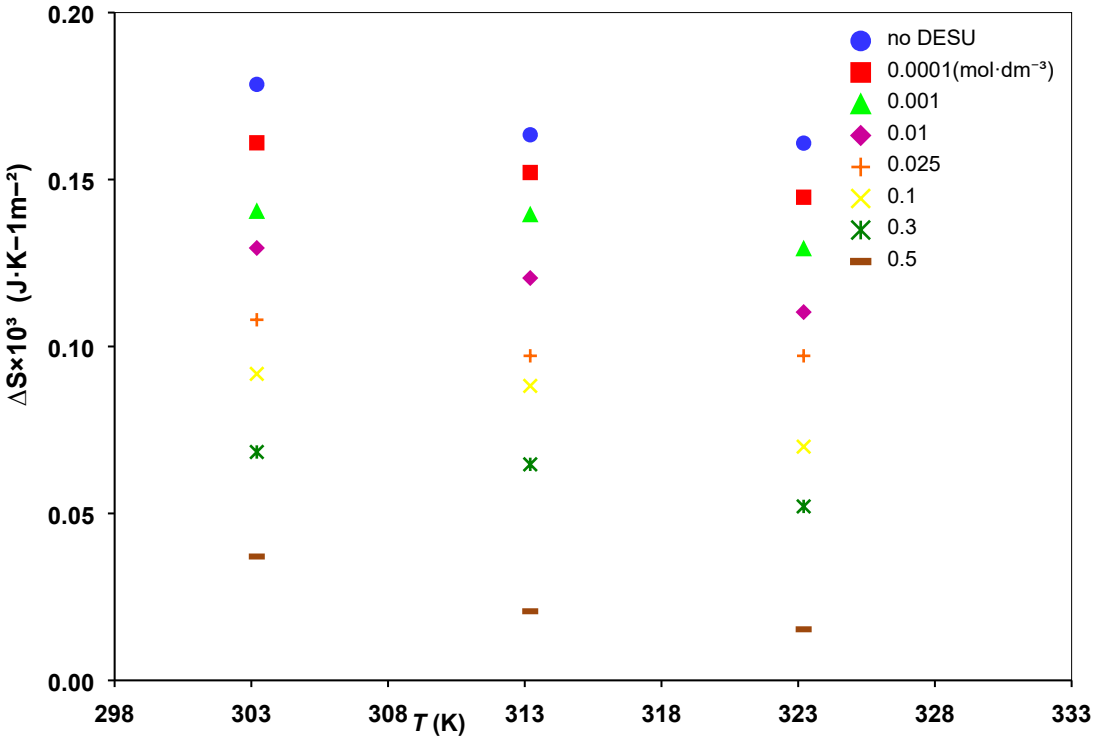

Fig. S6. The variation of entropy change of the DESU adsorption versus temperature.

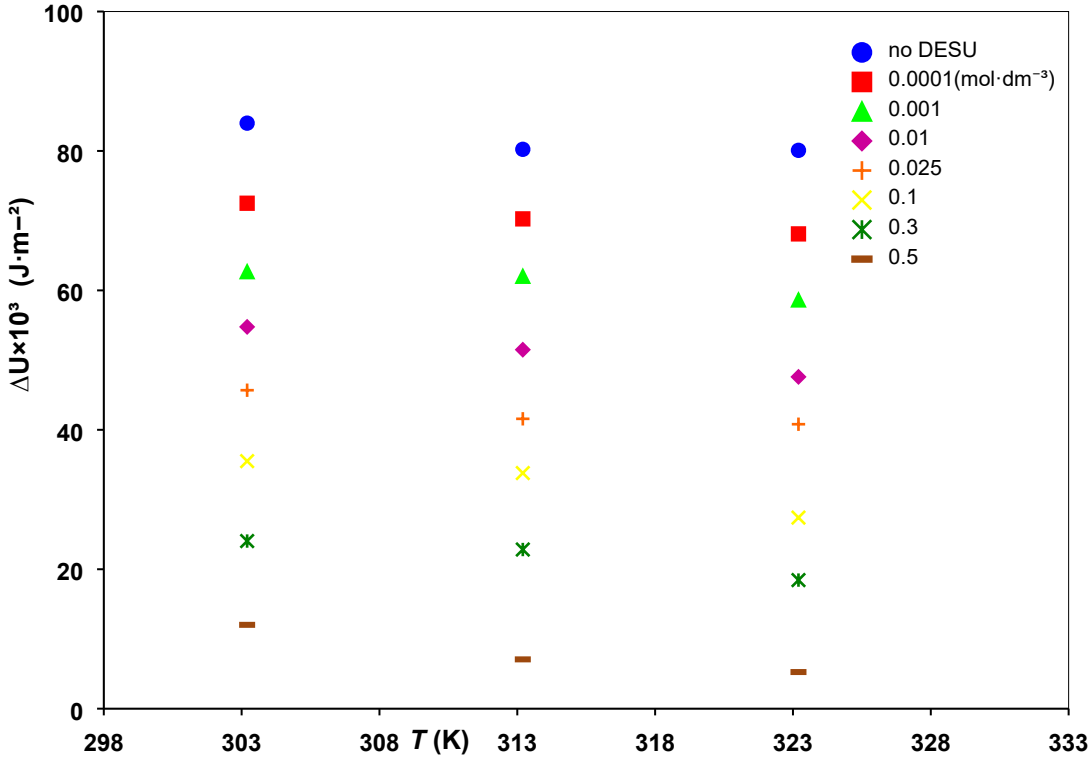

Fig. S7. The variation of energy change of the DESU adsorption process versus temperature.