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Trimeric surfactant as superior boundary lubricant NIR KAMPF, Department of Materials and Interfaces, Weizmann Institute of Science, Rehovot, Israel, CHUNXIAN WU, YILIN WANG, Key Laboratory of Colloid and Interface Science, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China, JACOB KLEIN, Department of Materials and Interfaces, Weizmann Institute of Science, Rehovot, Israel — Surfactants are widely used to modify surfaces and interfaces properties. A unique cationic trimeric surfactant, tri(dodecyldimethylammonioacetoxy)-diethyltriamine trichloride (DTAD), was found to form liposome-like aggregates in solution or a highly ordered bilayer patterns on mica surface [1,2]. We have investigated the normal and shear forces between two atomically smooth mica surfaces across this surfactant using the surface force balance (SFB) technique. Shear forces measured across the trimeric surfactant solution demonstrate ultra-low friction coefficient (μ=5x10^{-5}) under pressure of tens of atmospheres. AFM scans under the trimeric surfactant solution demonstrate the presence of large spheres (ca. 100nm in diameter) on the mica. The contribution of the compressed charged spheres to the ultra-low friction measured can be explained by the efficient hydration lubrication mechanism exist between the hydrated surfactant head-groups and the mica surface. A weak dependence of the friction coefficient to the shear rate or amplitude was observed.

[1] Hou et al., *Langmuir*, **24**, 10572 (2008).
[2] Wu et al., *Langmuir*, **26**, 7922 (2010).

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