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## Adventures at liquid surfaces and interfaces

Wednesday, 17 July 2024 09:00 (45 minutes)

Liquid surfaces and interface abound in living matter, industrial processes, and everyday life and activities. Elucidating their structure is prerequisite to the understanding of the functionalities involved and thus highly important. This talk will address briefly some of the liquid surfaces and interfaces studied to date by x-ray methods, e.g. "simple" liquids like water [1] and liquid metals [2], and the more intricate chain molecules [3]. The main focus will be, however, on Room Temperature Ionic Liquids (RTILs) [4,5], a novel class of Complex Liquids, the study of which has grown explosively since the mid-1990's, due to their many applications, ranging from electrochemical devices, through lubrication and pharmaceutical synthesis, to environmental application like CO<sub>2</sub> capture and industrial sludge treatment, and even to targeted drug delivery within the human body. Their tunable balance of competing dominant Coulomb and Van der Waals interactions, along with a number of more-minor other interactions, renders RTILs most interesting scientifically as well. We will discuss our recent x-ray studies of the surface and bulk structure of a model homologous series of RTILs, [C<sub>n</sub>MIM][NTf<sub>2</sub>], (n denoting the number of carbons in the cationic alkyl chain), which reveal the surface-bulk structural relations, and demonstrate intriguing structural variations with n, temperature, and the nature of the interface.

[1] A. Braslau et al. PRL 54, 114(1985); M. Fukuto et al. PRL 117, 256102(2016).

[2] O.M. Magnussen et al. PRL 74, 4444(1995); O. Shpyrko et al. PRB 69, 245423(2004); S. Mechler et al. PRL 105,186101(2010).

[3] X.Z. Wu et al. Science 261, 1018 (1993); B.M. Ocko et al. PRE 55,3164 (1997); S. Guttman et al. PNAS 113, 493(2016); S. Das et al. Nat. Phys. 18, 1177(2022)

[4] E. Sloutskin et al., JACS 127, 7796(2005); M. Mezger et al. Science 322, 428(2008); PNAS 110, 3733(2013).

[5] J. Haddad et al. PNAS 115, E1100(2018); D. Pontoni et al. SM 13, 6947(2017); JPCC 123, 3058(2019); JML 355, 118874 (2022); JCIS 661, 3(2024).

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Thin films and interfaces in soft matter and materials science

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**Session Classification:** Charged interfaces, chemical reactions and catalysis