

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Thermal boundary conductance of hydrophilic and hydrophobic ionic liquids¹ TAKAFUMI OYAKE, MASANORI SAKATA, SUSUMU YADA, The University of Tokyo, JUNICHIRO SHIOMI, The University of Tokyo, PRESTO Japan Science and Technology — A solid/liquid interface plays a critical role for understanding mechanisms of biological and physical science. Moreover, carrier density of the surface is dramatically enhanced by electric double layer with ionic liquid, salt in the liquid state. Here, we have measured the thermal boundary conductance (TBC) across an interface of gold thin film and ionic liquid by using time-domain thermoreflectance technique. Following the prior researches, we have identified the TBC of two interfaces. One is gold and hydrophilic ionic liquid, N,N-Diethyl-N-methyl-N-(2-methoxyethyl) ammonium tetrafluoroborate (DEME-BF₄), which is a hydrophilic ionic liquid, and the other is N,N-Diethyl-N-methyl-N-(2-methoxyethyl) ammonium bis (trifluoromethanesulfonyl) imide (DEME-TFSI), which is a hydrophobic ionic liquid. We found that the TBC between gold and DEME-TFIS ($19 \text{ MWm}^{-2}\text{K}^{-1}$) is surprisingly lower than the interface between gold and DEME-BF₄ ($45 \text{ MWm}^{-2}\text{K}^{-1}$). With these data, the importance of the wetting angle and ion concentration for the thermal transport at the solid/ionic liquid interface is discussed.

¹Part of this work is financially supported by Japan Society for the Promotion of Science (JSPS) and Japan Science and Technology Agency. The author is financially supported by JSPS Fellowship.

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Date submitted: 14 Nov 2014

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