Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Slip flow-enhanced streaming current in graphene oxide nanochannels[1] CHIH-CHANG CHANG, Department of Industrial Technology Education, National Kaohsiung Normal University, HUNG-WEI CHANG, RUEY-JEN YANG, Department of Engineering Science, National Cheng Kung University — In recent year, fast transport of water in carbon-based nanochannels due to the slip effect has attracted much attention. In this work, the pressure-driven streaming currents through sub-1nm nanochannels reconstructed by the layered material of graphene oxide (GO) was investigated experimentally and theoretically. The results show that the measured values of streaming current are 2~3 orders of higher than the predicted values calculated from electrokinetic model under no-slip assumption. It is inferred that the streaming current is greatly enhanced due to the presence of water slippage in sub-1nm partial wetting GO nanochannels. In addition, it is found that the slip length is strongly dependent on the KCl concentration, i.e., surface charge density. The estimated slip length is from 1 to 22nm. The lower surface charge density (KCl concentration) reveals the larger slip length. It is believed that our finding is beneficial to develop a higher efficiency of electro-kinetic power generator and electro-osmotic pump.

[1]Financial support from MOST of Taiwan under Project No. MOST 105-2218-E-167-001-MY2 and MOST 107-2221-E-017-008-MY2 is gratefully acknowledged.

Chih-Chang Chang
National Kaohsiung Normal University

Date submitted: 02 Aug 2019 Electronic form version 1.4