Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Electrowetting of electrolyte solution in a nanoslit with overlapped electric double layer: continuum approach[1] IN SEOK KANG, JUNG A. LEE, POSTECH — In a nanotube or nanoslit of O(10nm) lengthscale, the electric double layer (EDL) is expected to be overlapped. For this lengthscale, the continuum approach is still valid. In the present work, electrowetting phenomenon in a nanoslit is analyzed by using the electromechanical method based on the continuum governing equation. From the analysis, we obtain the formula of the extra-pressure that is generated by the electrowetting effect in a nanoslit. We also obtain the deformed shape of the electrolyte-gas interface by using the first order perturbation method. In order to handle the problem analytically, two limiting situations are considered: (i) the low surface potential limit to have a linearized Poisson-Boltzmann equation (PBE), and (ii) the high surface potential limit for which it is assumed that only the counter ions are present inside the nanoslit.

[1]This work has been supported by the BK21 program of the Ministry of Education, Science and Technology of Korea.

Dong Woog Lee
POSTECH

Date submitted: 10 Aug 2012 Electronic form version 1.4