

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Nanowire FET as a measurement tool: A method for distinguishing molecular configurations using Debye Screening effect**<sup>1</sup> ALEKSANDAR VACIC, JASON CRISCIONE, NITIN RAJAN, TAREK FAHMY, MARK REED, Yale University — Silicon nanowires/nanoribbons configured as field effect transistors (FETs) with receptor modified surface can be utilized for sensing of charged biomolecular species due to surface potential modulation upon receptor-ligand binding. However, charged ionic species of the sensing buffers interfere with a sensing process by lowering the effective charge of the bound molecules sensed by an FET. In this work, we exploit the Debye screening effect on the device signal by modulating the ionic strength of the sensing buffer i.e. the Debye length, to distinguish between the different configurations of the receptor-ligand complex. We compare our experimental data with a theoretical model and are able to extract characteristic length parameters of the receptor-ligand system. We will discuss the use of the suggested method for the sensing of conformational changes of biomolecules. References Sorensen M. H., Mortensen N. A., Brandbyge M., Appl. Phys. Lett. 91, 102105 (2007) Stern E., Vacic A., Rajan N. K., et al. Nature Nanotechnology 5, 138 (2010)

<sup>1</sup>This work was partially supported by the National Institutes of Health (NIH R01EB008260), DTRA (HDTRA1-10-1-0037), ARO (W911NF-08-1-0365), the Canadian Institute for Advanced Research (CIFAR).

Aleksandar Vacic  
Yale University

Date submitted: 22 Nov 2010

Electronic form version 1.4