Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Probing Biological Processes on Supported Lipid Bilayers with Single-Walled Carbon Nanotube Field-Effect Transistors XINJIAN ZHOU, LASSP, Cornell University, JOSE MANUEL MORAN-MIRABAL, School of Applied and Engineering Physics, Cornell University, HAROLD CRAIGHEAD , School of Applied and Engineering Physics, Cornell University, PAUL MCEUEN, LASSP, Cornell University — We have formed supported lipid bilayers (SLBs) by small unilamellar vesicle fusion on substrates containing single-walled carbon nanotube field-effect transistors (SWNT-FETs). We are able to detect the self-assembly of SLBs electrically with SWNT-FETs since their threshold voltages are shifted by this event. The SLB fully covers the NT surface and lipid molecules can diffuse freely in the bilayer surface across the NT. To study the interactions of important biological entities with receptors imbedded within the membrane, we have also integrated a membrane protein, GT1b ganglioside, in the bilayer. While bare gangliosides can diffuse freely across the NT, interestingly the NT acts as a diffusion barrier for the gangliosides when they are bound with tetanus toxin. This experiment opens the possibility of using SWNT-FETs as biosensors for label-free detection.

Xinjian Zhou
Cornell University

Date submitted: 30 Nov 2005 Electronic form version 1.4