Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Chemical sensing with ultra-thin MoS2 ADAM FRIEDMAN, Mater. Sci. and Tech. Div., US Naval Research Laboratory, KEITH PERKINS, Elec. Sci. and Tech. Div., US Naval Research Laboratory, ENRIQUE COBAS, Mater. Sci. and Tech. Div., US Naval Research Laboratory, PAUL CAMPBELL, GLENN JERNIGAN, Elec. Sci. and Tech. Div., US Naval Research Laboratory, BEREND JONKER, Mater. Sci. and Tech. Div., US Naval Research Laboratory — Although the majority of focus and excitement in recent years has been on studying the remarkable properties of single atomic-layer graphene, there exists a whole class of materials called dichalcogenides that are relatively easily fabricated in single-crystal mono- or few-layer format. Graphene, being chemically inert, does not lend itself to chemical sensing applications. However, MoS2, a dichalcogenide of recent interest because of its potential for transistor applications, possesses many advantageous properties for chemical sensing. Two primary examples include a sizable bandgap, which is necessary for fabricating transistors with large on/off current ratios, and a chemically reactive surface, which is necessary for easy surface functionalization. In this talk, we discuss our current research effort on MoS2 chemical sensors. We discuss aspects of transistor device fabrication and chemical sensing experiments. We expose MoS2 chemical sensors to a variety of analytes, finding the best response to triethylamine, a nerve gas by product, and explain our results based on a donor-acceptor model. MoS2 sensors are compared to other similar low-dimensional sensors and found to be of comparable quality.

Adam Friedman
Mater. Sci. and Tech. Div., US Naval Research Laboratory

Date submitted: 07 Nov 2012 Electronic form version 1.4