Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

A comparison of $MoSe_2$ field-effect transistors on SiO_2 and parylene-C substrates: possible surface polar phonon effects[1] BHIM CHAMLAGAIN, Wayne State University, QING LI, MINGHU PAN, Oak Ridge National Laboratory, TUGENG HONG, HSUEN-JEN CHUANG, MEEGHAGE PERERA, Wayne State University, YONG XU, Wayne State Univversity, DI XAIO, Carnegie Mellon University, NIRMAL GHIMIRE, JIAQIANG YAN, DAVID MANDRUS, University of Tennessee, ZHIXIAN ZHOU, Wayne State University — We report the fabrication and electrical characterization of high quality $MoSe_2$ field-effect transistors fabricated on both SiO_2 and parylene-C substrates. Multilayer $MoSe_2$ on parylene-C shows a significantly higher room temperature mobility of 100 $cm^2V^{-1}s^{-1}$– 160 $cm^2V^{-1}s^{-1}$ than that on SiO_2 ($\approx$50 $cm^2V^{-1}s^{-1}$). Our variable temperature transport measurements indicate that the mobility of $MoSe_2$ devices on both SiO_2 and parylene-C increases to $\approx$ 500 $cm^2V^{-1}s^{-1}$ as the temperature decreases to below 100 K, with the mobility of $MoSe_2$ on SiO_2 increasing more rapidly. We attribute the observed difference in mobility and its temperature dependence between $MoSe_2$ on SiO_2 and on parylene-C primarily to the surface polar optical phonon scattering in the SiO_2 substrate, which is absent in parylene-C.

[1]This work was supported by NSF (No. ECCS-1128297).

Bhim Chamlagain
Wayne State Univversity

Date submitted: 13 Nov 2013 Electronic form version 1.4