Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

High-Performance WSe_2, MoS_2, and $MoSe_2$ Transistors Enabled by a New Contact Strategy HSUN JEN CHUANG, BHIM CHAMLAGAIN, Wayne State University, MICHAEL KOEHLER, The University of Tennessee, MEEGHAGE MADUSANKA PERERA1, Wayne State University, JIAQIANG YAN, Oak Ridge National Laboratory, DAVID MANDRUS, The University of Tennessee, DAVID TOMNEK, Michigan State University, ZHIXIAN ZHOU, Wayne State University — Fabrication of high-performance transistors of transition metal dichalcogenides (TMDs) including WSe_2, MoS_2, and $MoSe_2$ has been a major challenge in 2D electronics. The performance of current metal-contacted TMDs is limited by the presence of a significant Schottky barrier in most cases. Here we introduce a new strategy for fabricating low-resistance ohmic contacts to a variety of TMDs. We demonstrate low contact resistance ≈ 0.3 k$\Omega\mu$m, high on/off ratios up to $>10^9$, and high drive currents exceeding 320 μA μm^{-1} in few-layer WSe_2 field-effect transistors (FETs). These favorable characteristics are combined with a two-terminal field-effect hole mobility $\mu_{FE} \approx 2\text{x}10^2$ cm^2 V^{-1}s^{-1} at room temperature, which increases to $>2\text{x } 10^3$ cm^2 V^{-1} s^{-1} at cryogenic temperatures. We observe a similar performance also in MoS_2 and $MoSe_2$ FETs. *We acknowledge the partial support by NSF grant number DMR-1308436 and the WSU Presidential Research Enhancement Award.

Hsun Jen Chuang
Wayne State University

Date submitted: 06 Nov 2015

Electronic form version 1.4