Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Correlating Structural and Electronic Degrees of Freedom in 2D Transition Metal Dichalcogenides I-CHENG TUNG, Z. ZHANG, Advanced Photon Source, Argonne National Laboratory, K. L. SEYLER, A. M. JONES, Department of Physics, University of Washington, G. CLARK, Department of Materials Science and Engineering, University of Washington, D. XIAO, Department of Physics, Carnegie Mellon University, N. LAANAIT, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, X. XU, Department of Physics, University of Washington, H. WEN, Advanced Photon Source, Argonne National Laboratory — We have conducted a microscopic study of the interplay between structural and electronic degrees of freedom in two-dimensional (2D) transition metal dichalcogenide (TMD) monolayers, multilayers and heterostructures. Using the recently developed full field x-ray reflection interface microscopy with the photoluminescence microscopic probe capability at the Advanced Photon Source, we demonstrated the x-ray reflection imaging of a monolayer 2D material for the first time. The structural variation across an exfoliated WSe_2 monolayer is quantified by interlayer spacing relative to the crystal substrate and the smoothness of the layer. This structural information is correlated with the electronic properties of TMDs characterized by the *in-situ* photoluminescence measurements. This work is supported by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under Contract No. DE-SC0012509. The use of Advanced Photon Source is supported by U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences under Contract No. DE-AC02-06CH11357.

I-Cheng Tung
Advanced Photon Source, Argonne National Laboratory

Date submitted: 05 Nov 2015 Electronic form version 1.4