Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Direct growth of single- and few-layer $MoS_2$ on h-BN by CVD method**[1] AIMING YAN, JAIRO VELASCO, JR., SALMAN KAHN, Univ of California - Berkeley, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, Japan, FENG WANG, MICHAEL CROMMIE, Univ of California - Berkeley, ALEX ZETTL, Univ of California - Berkeley;Materials Sciences Division, LBNL;Kavli Energy NanoSciences Institute at the Univ of California, Berkeley and LBNL — As a promising candidate for the next-generation electronics, large-scale single- and few-layer molybdenum disulfide ($MoS_2$) grown by CVD method is an important advancement towards technological implementation of this material. However, the choice of substrate can significantly affect the performance of $MoS_2$ based devices. An attractive insulating substrate or mate for $MoS_2$ (and related materials such as graphene) is hexagonal boron nitride (h-BN). Stacked heterostructures of $MoS_2$ and h-BN have been produced by manual transfer methods, but a more efficient and scalable assembly method is needed. Here we demonstrate the direct growth of single- and few-layer $MoS_2$ on h-BN by chemical vapor deposition (CVD) method. The growth mechanisms for single- and few-layer samples are found to be distinct, and for single-layer samples low relative rotation angles ($<5$) between the $MoS_2$ and h-BN lattices prevail. In addition, $MoS_2$ directly grown on h-BN maintains its intrinsic 1.89 eV bandgap. Our CVD synthesis method presents a viable path towards high-quality $MoS_2$ based field effect transistors in a controllable and scalable fashion.

[1]Acknowledgement: the U.S. Department of Energy under Contract DE-AC02-05CH11231; NSF grant DMR-1206512

Aiming Yan
Univ of California - Berkeley

Date submitted: 06 Nov 2015 Electronic form version 1.4