Abstract Submitted
for the PSF14 Meeting of
The American Physical Society

Observation of interlayer phonon mode in monolayer MoS2/WSe2 heterostructures[1] ZHIPENG YE, CHAO JI, CASIE MEANS-SHIVELY, HEIDI ANDERSON, TIM KIDD, Univ of Northern Iowa, CHUN HUNG LUI, TROND I. ANDERSEN, Massachusetts Institute of Technology, KUAN-CHANG CHIU, CHENG-TSE CHOU, JENN-MING WU, YI-HSIEN LEE, National Tsing Hua University, Taiwan, RUI HE, Univ of Northern Iowa — Transition metal dichalcogenides (TMDs), e.g. MoS2, MoSe2, WS2, and WSe2, have risen as a new generation of materials with remarkable properties. We have observed, by means of Raman spectroscopy, the formation of interlayer breathing mode phonons in heterobilayers formed from monolayers of MoS2 and WSe2. The heterogeneous layer breathing mode has a resonant frequency between those of bilayer MoS2 and bilayer WSe2. Its Raman response correlates strongly with the suppression of photoluminescence arising from interlayer electron-hole separation. While the interlayer phonon mode is hardly affected by the lattice mismatch and relative orientation of the two monolayers, it is sensitive to the interlayer spacing and can only be generated in heterostructures with atomically close layer-layer contact.

[1]Supported by ACS PRF (Grant 53401-UNI10), NSF grant (DMR-1206530, DMR-1410496), and the Ministry of Science and Technology of the Republic of China (103-2112-M-007-001-MY3).

Zhipeng Ye
Univ of Northern Iowa

Date submitted: 10 Nov 2014 Electronic form version 1.4