Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Interlayer electron-hole pair multiplication by hot carriers in atomic layer semiconductor heterostructures[1] FATEMEH BARATI, MAX GROSSNICKLE, SHANSHAN SU, ROGER LAKE, VIVEK AJI, NATHANIEL GABOR, Univ of California - Riverside — Two-dimensional heterostructures composed of atomically thin transition metal dichalcogenides provide the opportunity to design novel devices for the study of electron-hole pair multiplication. We report on highly efficient multiplication of interlayer electron-hole pairs at the interface of a tungsten diselenide / molybdenum diselenide heterostructure. Electronic transport measurements of the interlayer current-voltage characteristics indicate that layer-indirect electron-hole pairs are generated by hot electron impact excitation. Our findings, which demonstrate an efficient energy relaxation pathway that competes with electron thermalization losses, make 2D semiconductor heterostructures viable for a new class of hot-carrier energy harvesting devices that exploit layer-indirect electron-hole excitations.

[1]SHINES, an Energy Frontier Research Center funded by the U.S. Department of Energy, Air Force Office of Scientific Research

Fatemeh Barati
Univ of California - Riverside

Date submitted: 17 Nov 2016 Electronic form version 1.4